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Inheritance Customs and the European Marriage Pattern^{*}

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Abstract

Centuries before the demographic transition, the European Marriage Pattern (EMP) limited fertility in Western Europe through high celibacy, late marriage, and nuclear households. Whether the EMP reflected economic distress or female empowerment remains debated. This paper shows that local inheritance institutions determined which of these interpretations prevails. To do so, we develop a model of marriage, inheritance, and local labor endowments and estimate it using genealogical data on 75,000 women born in 1500–1750, combined with a new atlas of 2,486 rural and urban inheritance customs in France and Belgium. We document four new facts that we use to estimate the deep parameters of the model: *(i)* egalitarian inheritance – which included women and younger children – weakened the EMP in rural areas; *(ii)* but strengthen it in urban areas; *(iii)* earning opportunities are positively associated to the EMP where inheritance was egalitarian, but negatively where inheritance was inequalitarian; and *(iv)* these patterns persisted throughout the early-modern period. We use the model’s estimates to decompose the share of EMP reflecting women’s choices versus economic constraint. We show that 65 percent of celibacy reflected choice, that this varies across space, and that it is strongly associated to women’s local inheritance rights. Our findings call for rethinking [Hajnal \(1965\)](#)’s canonical characterization of the EMP along a new dimension: whether celibacy was empowered or constrained.

JEL classification: D10, J10, K11, N33, O10.

Keywords: *European Marriage Pattern, Celibacy, Customs, Inheritance.*

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1 Introduction

Centuries before the demographic transition, Western Europeans already limited fertility through the European Marriage Pattern (EMP), a demographic regime characterized by late marriage, high rates of lifetime celibacy, and the predominance of nuclear households (Hajnal 1965). Because the EMP coincided with the Little Divergence (1350–1800) and Europe’s early rise to riches, it has been proposed as one explanation for Europe’s long-run growth.¹ Yet Hajnal’s three defining features of the EMP describe how often and how late Europeans married, not why. A woman could remain unmarried because she could not afford to marry, or because she chose to be celibate. These two forms of celibacy have opposite implications for Europe’s development, and nothing in the canonical characterization of the EMP distinguishes between them.

Which form prevailed remains highly contested among demographers and economists. On one side, celibacy and delayed marriage may reflect female empowerment (De Moor and Van Zanden 2010; Carmichael, De Moor, and van Zanden 2011; Carmichael et al. 2015) and women’s earning opportunities in the labor market (Voigtländer and Voth 2013). Alternatively, they may reflect poverty: because marriage required establishing an independent household, individuals without sufficient resources postponed marriage or remained celibate (Dennison and Ogilvie 2014 and 2016). The same demographic regime, high celibacy and late age at marriage, can therefore signal either economic opportunity or economic constraint.

Distinguishing between these interpretations is crucial for understanding whether the EMP contributed to Europe’s long-run growth or, instead, reflected economic hardship. However, disentangling these two theories is challenging. It requires observing marriage behavior at a level of geographic and institutional detail rarely available for pre-industrial Europe (Ruggles 2012). Existing evidence on the EMP often relies on small, isolated localities observed at particular points in time and then used to characterize much larger regions or countries.² Such aggregation obscures the subnational variation needed to relate marriage behavior to local economic conditions and institutions (Szołtysek, Ogórek, and Gruber 2021), making it difficult to establish where the EMP reflected empowerment, where economic constraint, and what explains the difference.

This paper uncovers a new factor that determined where the EMP reflected female empowerment and where economic hardship: legal institutions regulating inheritance. We overcome the data limitations that have restricted previous research by combining a new local-level atlas of inheritance customs with individual marriage histories reconstructed from crowdsourced genealogies for 75,000 women born in 1500–1750 across more than 15,000 locations in France and Belgium.³ Using these data, we re-visit Hajnal (1965)’s original hypothesis that inheritance crucially shaped marriage decisions. On the one hand, forming the independent household characteristic of the EMP required substantial investments in land and housing. Inheriting wealth

¹The Little Divergence refers to the process of differential growth by which the North Sea Area became the most prosperous part of Europe.

²See Dennison and Ogilvie (2014), Szołtysek, Ogórek, and Gruber (2021), and <http://www.ehps-net.eu/databases> for an overview of existing datasets.

³Throughout the paper, we use Belgium as shorthand for the territory in the Low countries corresponding to present-day Belgium; the Belgian state itself did not exist during our period of study.

could therefore relax these financial constraints; while lack of inheritance rights could increase celibacy rates (henceforth, *constrained celibacy*). On the other hand, inheritance, particularly women’s inheritance rights, provided economic resources outside marriage, allowing women to remain unmarried even when marriage was an important source of economic security (henceforth, *empowered celibacy*). Hence, different rules governing the inheritance of family assets can shape the nature of the EMP and its relationship to female empowerment or economic constraint. The link between the EMP and inheritance is particularly relevant in pre-industrial Europe, where inheritance institutions varied sharply across space. This institutional mosaic therefore provides a natural candidate for explaining why the EMP could differ across nearby localities. In detail, before the French Revolution, inheritance was governed by local customary law in most of Europe. Neighboring judicial districts—and sometimes towns within the same district—could follow different rules. Some adhered to *egalitarian inheritance*, which divided family property among all children, including women. Others followed *inegalitarian inheritance*, which did not grant women inheritance rights, concentrated property in one heir, or did both.

Our main finding is that inheritance customs determined where the EMP reflected female empowerment and where economic hardship. This is illustrated in Figure 1, which shows the relationship between female celibacy and FAO’s pasture suitability index across 992 judicial districts (and their exclaves) in France and Belgium in 1500–1750.⁴ We focus on pasture suitability because Hajnal’s family formation model identifies the gradient between the EMP and husbandry as a defining feature of the EMP (Hajnal 1982, p. 450, 453, 473, 478).⁵ Pasture suitability captures the prevalence of pastoral agriculture and husbandry, a major source of female employment in pre-industrial Europe (Kusmaul 1981). Under inegalitarian inheritance, higher pasture suitability is associated with lower celibacy, indicating that the EMP was most pronounced where women lacked both inheritance and labor market access. Under egalitarian inheritance, the relationship reverses: high celibacy—and thus the EMP—manifested among women with access to both inheritance and labor markets. In other words, where inheritance was inegalitarian, the EMP was primarily associated with economic distress, whereas under egalitarian inheritance it manifested alongside earning opportunities. This reconciles the two competing interpretations of the EMP, suggesting that they are not mutually exclusive. Instead, they describe different institutional environments, namely, different inheritance regimes.

To decompose the relative importance of these two forces—financial constraints and female empowerment—we use our rich data to document four stylized facts about the EMP and rural inheritance customs, urban customs, the EMP-earning opportunities gradient, and how these relationships change over time. We then use these stylized facts to estimate a structural model of marriage and inheritance that allows us to disentangle the shares of constrained and empowered celibacy across regions of France and Belgium. We find that celibacy reflected both financial constraints and female empowerment, but that the latter dominated across much of Belgium and France, and that women’s inheritance rights substantially tilted celibacy from constraint toward empowerment.

We establish four new facts about the EMP. First, in rural areas, egalitarian inheritance

⁴We construct equal-sized bins after residualizing celibacy and pasture suitability with respect to decade and region fixed effects. To preserve the original scale, the sample means are added back after residualization.

⁵See also Szoltysek, Ogórek, and Gruber (2021) for a thorough discussion of this gradient.

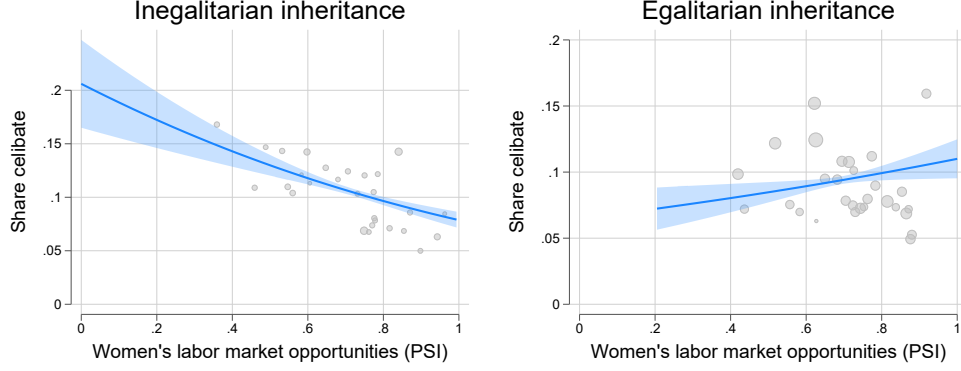


Figure 1: EMP-pasture gradients, by inheritance regime.

Notes: This figure displays equal-size binned scatter plots for the relationship between the pasture suitability index (PSI) and celibacy. The sample is women born in 1500–1750 in rural custom regions, whose Geni record can be geo-located, who died after age 40, and whose birthplace is covered by data on pasture suitability (see Section 3). All variables are residualized by decade and region fixed effects, then means are added back; 95% confidence intervals.

is associated with lower celibacy and earlier marriage. Women were 2.6 percentage points less likely to remain celibate—a 26 percent decline relative to the mean—and married approximately 0.2 years earlier where inheritance was divided among all children, including women. This fact is consistent with a financial-constraint mechanism. Under neolocal marriage, couples needed sufficient resources to establish an independent household. Egalitarian inheritance relaxed these constraints by broadening access to the resources needed for household formation. Yet if financial constraints were the only mechanism behind the EMP, greater economic opportunities should uniformly reduce celibacy and age at marriage. The next two facts challenge this view.

The second fact is that the relationship reverses in urban areas: Among women born in towns with their own inheritance customs, egalitarian inheritance increases rather than decreases celibacy. The reversal is informative because the EMP and, especially its view reflecting female empowerment, has often been linked to commercialized, urban settings of North-Western Europe (De Moor and Van Zanden 2010).

The third fact is the most central to our interpretation. It establishes that the inheritance regime shapes how the EMP responds to women’s labor market opportunities. As illustrated in Figure 1, we find opposite gradients across inheritance systems. Under inegalitarian inheritance, a one-standard-deviation increase in pasture suitability reduces female celibacy by 1.5 percentage points. Greater earning opportunities therefore weaken the EMP when access to family wealth is restricted, consistent with income relaxing the financial constraints on marriage and independent household formation. Under egalitarian inheritance, the relationship has the opposite sign: greater labor-market opportunities increase celibacy, consistent with the view that celibacy and the EMP reflected female empowerment. We find the same pattern using an alternative proxy for women’s economic opportunities based on proximity to beguinages—communities that provided unmarried women with opportunities to work, accumulate income, and live outside marriage (Frigo and Roca Fernández 2022).

The fourth fact is that these patterns persist for centuries between 1500 and 1750. With the exception of the General Crisis of the seventeenth century, cohort-specific estimates remain

stable over 250 years. The relationship between inheritance and the EMP therefore appears to have been a persistent feature of the pre-industrial economy rather than the product of Malthusian shocks or secular demographic trends.

We establish these facts using two new datasets at an unusually fine geographic scale. First, we build an atlas of 200 rural and 2,286 urban inheritance customs in France and Belgium. For Belgium, we construct a new GIS of 167 eighteenth-century judicial districts from historical maps, assign rural and urban customs from historical legal compendia, and code their inheritance rules. For France, we build on the *Customary Atlas of Ancien Régime France* (Gay, Gobbi, and Goñi 2024), supplementing it with 703 new urban customs. The resulting atlas maps inheritance institutions at the judicial-district and, where towns followed distinct customs, urban levels. Second, we construct marriage histories from crowdsourced genealogies on [Geni.com](https://www.geni.com), a MyHeritage Company. These cover 79,590 women born in 1500–1750 across 15,326 locations in France and Belgium. This granularity allows us to match individual marriage outcomes to local inheritance customs and exploit variation that would disappear in regional or country-level data: celibacy rates sometimes range from nearly zero to 30 percent across neighboring judicial districts.

The empirical setting offers a number of advantages. First, French and Belgian customs trace their origins to the laws of Germanic peoples who settled the territory after the Fall of Rome in 476 (Chénon 1926; Gilissen 1979), centuries before the EMP. Consistently, egalitarian and inegalitarian judicial districts are largely balanced across potential confounders—including geography, climate, agricultural productivity, early development, religiosity, and political turmoil—with only one of 25 differences significant at the 5 percent level across neighboring districts. We exploit this feature to address endogeneity concerns. In detail, we exploit local variation within administrative regions just one level above districts, and in addition estimate our main stylized facts under a cross-border design comparing pairs of contiguous districts with different inheritance rules—hence accounting for unobservables that vary smoothly across space.⁶ Second, inheritance customs were consequential for a large share of the population. In France and Belgium, 40 to 80 percent of households owned land, and land and credit markets were underdeveloped.⁷ Hence, inheritance essentially governed access to land for most of the population. Third, because crowdsourced data are inherently noisier than family reconstructions or census records, we construct quality filters addressing the most common biases in crowdsourced genealogies—false-positive links, patrilineal bias, and survival bias—and show that our stylized facts remain largely unchanged. We also benchmark celibacy against the high-quality datasets: the Enquête Henry (Henry and Houdaille 1978), the TRA dataset (Bourdieu, Kesztenbaum, and Postel-Vinay 2013), and national averages in Dennison and Ogilvie (2014). Finally, we find similar patterns for men and assess the robustness of the stylized facts to spatial trends, spatial correlation of errors, and alternative clustering schemes; allowing demographic outcomes to follow different trends by region; permutation tests; birth-year heaping quality filters; non-linear specifications; and to alternative definitions of rural and urban areas.

We then develop a model to decompose the relative importance of financial constraints and

⁶See Dube, Lester, and Reich (2010) and Moscona, Nunn, and Robinson (2020) for cross-border designs.

⁷See Bourdieu, Kesztenbaum, and Postel-Vinay 2013; Vanhaute 2001; Gay, Gobbi, and Goñi 2026 and Finley, Franck, and Johnson 2021.

female empowerment—the two mechanisms uncovered by our stylized facts. In our model, men and women differ in income and inheritance rights and are randomly matched within local marriage markets. Matches result in marriage only by mutual consent. Once married, couples share resources under a collective decision model (Chiappori 1988) and jointly allocate them between consumption and investment in the household, which is a public good within the couple. Inheritance can therefore affect marriage through two channels. By providing resources for household formation, it relaxes financial constraints that may otherwise prevent marriage. At the same time, by increasing resources available outside marriage, inheritance strengthens the outside option of remaining single. The model thus distinguishes individuals who remain celibate because they cannot afford to establish an independent household (i.e., constrained celibacy), from those who could marry but prefer not to (i.e., empowered celibacy).

We structurally estimate the model using our stylized facts for rural areas. The model reproduces differences in celibacy levels (Fact 1), as well as the opposite effect of women’s earning opportunities under egalitarian and inegalitarian inheritance (Fact 3). It also reproduces observed aggregate celibacy rates despite these not being directly targeted. The decomposition reveals that approximately 65 percent of celibate women chose not to marry, while 35 percent remained unmarried because of economic constraints. Hence, the two competing explanations of the EMP were not quantitatively equivalent in France and Belgium: the evidence favors the female empowerment interpretation.

These aggregate results, however, mask substantial local heterogeneity. The estimated share of empowered celibacy is higher in areas where women can inherit—72 percent compared with 50 percent where they do not. In addition, the relationship between women’s earning opportunities and the share of empowered celibacy is stronger where women can inherit. Hence, women’s inheritance rights shaped the nature of the EMP twice over: they tilted celibacy toward empowerment and amplified the effect of women’s earning opportunities.

We use counterfactual experiments to further explore which dimensions of customary law mattered most for the EMP. We consider eight counterfactuals that vary the two dimensions of inheritance institutions—the division rule (equal division or inheritance by a single heir) and women’s inheritance rights (yes or no)—across France and Belgium. Extending inheritance rights to all women is the most consequential in shifting celibacy away from financial constraint and toward female empowerment. Rules governing the division of assets play a different role, primarily affecting the prevalence of celibacy, while their effect on the nature of celibacy depends on how they interact with women’s inheritance rights. Altogether, these counterfactuals show that whether the EMP reflected empowered or constrained celibacy depended not only on women’s earning opportunities but also on the legal institutions governing access to family wealth.

Taken together, our results reconcile competing interpretations of the EMP: inheritance institutions explain why celibacy reflected economic hardship in some places and female empowerment in others. Yet the two mechanisms were not quantitatively equivalent: roughly two-thirds of celibacy reflected empowerment rather than financial constraint. This lends credence to interpretations linking the EMP to female autonomy and economic development, at least in France and Belgium.

Relative to the existing literature, our paper makes four contributions. First, our findings shed new light on the debate over the relationship between the EMP and Europe’s riches. One view links the EMP to female autonomy, human-capital accumulation, and Malthusian equilibrium with higher incomes.⁸ Another emphasizes that the EMP prevailed in economically stagnant areas or where gender wage gaps were large.⁹ We reconcile these views: the same demographic pattern (high celibacy and late marriage) could reflect female empowerment where inheritance institutions strengthened women’s outside options, and economic hardship and constraints on household formation where inheritance was inegalitarian. Our findings therefore call for rethinking Hajnal (1965)’s canonical characterization of the EMP—late age at marriage, high lifetime celibacy, and nuclear household formation—along a fourth dimension: whether celibacy was empowered or constrained. In France and Belgium, local inheritance institutions were central to determining which form prevailed.

Second, we provide, to the best of our knowledge, the first micro-level test of a long-standing hypothesis linking inheritance to the EMP (Hajnal 1982; Lanzinger 2003a; Horrell 2023). While this link has been much debated among sociologists and economists, empirical evidence for or against it is lacking. The main reason is that there exists no complete, local-level atlas of inheritance customs, and that granular data on marriage decisions is rarely available for pre-industrial Europe. Indeed, much previous research on the EMP relies on the first census collected by the early 1800s (Carmichael et al. 2016, p. 200), while the EMP dates back several centuries. One of our contributions is to construct new datasets that allow studying the inheritance-EMP relationship at a scale unavailable in conventional historical-demographic sources. We construct the first GIS of inheritance customs for Belgium and urban areas of France and Belgium,¹⁰ and combine it with crowdsourced genealogies for birth cohorts going back as far as 1500. This contributes to efforts to expand the scale of historical demographic microdata (Ruggles 2012) and to the use of large-scale crowdsourced genealogies (Blanc 2022).

In doing so, we uncover a novel institutional determinant of local variation in the EMP: inheritance customs. Hajnal’s seminal work (Hajnal 1965; Hajnal 1982) characterized the EMP as a uniform pattern. In contrast, subsequent research has documented substantial heterogeneity in its prevalence across social groups, family systems, and countries within North-West Europe.¹¹ This heterogeneity challenges Hajnal’s assumption that the defining features of the EMP covaried uniformly across Western Europe, and raises what Szołtysek, Ogórek, and Gruber (2021, p. 69) calls “one of historical demography’s most intriguing puzzles.” We provide an institutional explanation: local inheritance rules account for part of the variation in the prevalence of the EMP within France and Belgium.

⁸De Moor and Van Zanden 2010; Carmichael, De Moor, and van Zanden 2011; Carmichael et al. 2015; Van Zanden, De Moor, and Carmichael 2019; Foreman-Peck 2011; Foreman-Peck and Zhou 2018; Schulz et al. 2019; Voigtländer and Voth 2013.

⁹Dennison and Ogilvie 2014; Dennison and Ogilvie 2016; Szołtysek and Ogórek 2020; Szołtysek, Ogórek, and Gruber 2021; Le Bris and Tallec 2022; Palma, Reis, and Rodrigues 2021.

¹⁰Gilissen (1979) sketched a paper map of historical customary regions in Belgium. Our GIS maps these regions at higher, municipality-level precision.

¹¹Barbagli (1991), Alter (1996), Engelen and Wolf (2005), Dennison and Ogilvie (2014), Perrin (2022), de la Croix, Schneider, and Weisdorf (2019), Szołtysek and Ogórek (2020), Szołtysek, Ogórek, and Gruber (2021). Relatedly, Horrell, Humphries, and Weisdorf (2020) document gender differences in how economic conditions affect marriage choices. Clark, Cummins, and Curtis (2024) find that fertility choices were socially transmitted, suggesting that local conditions such as inheritance customs might have helped the EMP persist over time.

Third, more generally, our findings reveal a striking parallel between marriage decisions under the EMP and those observed today. Modern evidence finds a U-shaped relationship between female celibacy and education ([Greenwood et al. 2016](#); [Baudin, de la Croix, and Gobbi 2020](#)). We find a similar U-shaped pattern in pre-industrial Europe between celibacy and economic opportunities, attesting to the modernity of the EMP.

Fourth, we contribute to a growing literature on the economic consequences of inheritance systems. Inheritance institutions affect inequality, development, gender gaps, education, and pensions,¹² but less is known about their role in family formation. [Ogilvie and Schaff \(2025\)](#) show that partible inheritance strengthened women’s economic independence in sixteenth-century Württemberg. Closest to our paper, [Gay, Gobbi, and Goñi \(2026\)](#) show that the abolition of local inheritance customs during the French Revolution reduced fertility differences between egalitarian and inegalitarian areas, contributing to the Demographic Transition. We instead move back several centuries to show that inheritance customs shaped the preceding demographic regime—the EMP. Finally, because customary law emanates from local norms, we underscore a novel institutional channel through which culture can affect demographic choices and development ([Giuliano 2007](#); [Fernandez and Fogli 2009](#)).

The remainder of the paper proceeds as follows. Section 2 describes the EMP and customary laws in France and Belgium. Section 3 introduces the inheritance atlas and the Geni dataset. Section 4 establishes the new stylized empirical facts. Section 5 develops the model, and Section 6 estimates it and presents the counterfactual results. Section 7 concludes.

2 Historical background

2.1 The European Marriage Pattern

According to [Hajnal \(1965\)](#), the European Marriage Pattern (EMP) emerged west of an imaginary line from Trieste to St. Petersburg. Its defining features were late age at first marriage, high rates of celibacy, and a predominance of nuclear households alongside neolocal marriage, whereby newly married couples established independent households rather than co-residing with parents or kin in extended family units ([Flinn 1981](#); [De Moor and Van Zanden 2010](#)). The key consequence of the EMP was lower fertility. Estimates suggest that, between the fourteenth and nineteenth centuries, 25–40 percent of potential biological births were avoided ([Voigtländer and Voth 2013](#), p. 2227).

For Belgium and northern France, [Dennison and Ogilvie \(2014\)](#) document strong EMP features using estimates observed at different dates between the seventeenth and nineteenth centuries: an average female age at first marriage of, respectively, 26.4 and 25.3, lifetime female celibacy of 20.4 and 11.5 percent, and only 13 and 16 percent of households that were extended or multiple-family units. Appendix Table [A1](#) reports these three EMP features for 24 countries or subnational regions, highlighting both the distinctiveness of Western Europe and substantial variation across and within countries ([Dennison and Ogilvie 2014](#))—a key feature of the EMP often ignored.

¹²[Piketty \(2011\)](#), [Bartels, Jäger, and Obergruber \(2024\)](#), [Bertocchi and Bozzano \(2015\)](#), [Galasso and Profeta \(2018\)](#).

A central feature of the EMP was residential independence from parents: most married couples followed neolocal residence, and unmarried individuals often lived separately from parents as servants, lodgers, or in solitary households (Hajnal 1982; Kussmaul 1981). As Wall (1989, p. 372) notes, “a number of individuals, although admittedly only a very small minority, could live on their own in a pre-industrial society.” According to the 1814 census of rural Bruges (Belgium), 15-17 percent of single women over 30 were heads of their own household, and 27.3 percent of them owned land or real state (De Langhe 2012, Table 7 and p. 206). In cities and market towns, households headed by single women were common, representing 18 and 22 percent of all tax-paying households in, respectively, eighteenth-century Grenoble (France) and seventeenth-century Bridgnorth (England) (Schmidt, Devos, and Blondé 2015, p. 5). Moreover, inventories suggest that a “considerable share of single households in late medieval Bruges [...] occupied houses that were well equipped to receive guests [and] owned the same kind of furniture” as married households, and that single women in Bridgnorth did not “lag behind male-headed households” (Schmidt, Devos, and Blondé 2015, pp. 17–18).

The origins of the EMP remain debated. Voigtländer and Voth (2013) argue that the Black Death (1348) raised female employment and the opportunity cost of early marriage by shifting production toward pastoralism—a major source of female employment in pre-modern Europe (Kussmaul 1981; Beauvalet 2005; Whittle and Hailwood 2020). Indeed, local climate and soil conditions favoring pasture were associated with higher female wages in nineteenth-century Belgium (Appendix Table D1). Edwards and Ogilvie (2022) have questioned whether the EMP emerged as a consequence of the Black Death, while De Moor and Van Zanden (2010) and Van Zanden, De Moor, and Carmichael (2019) emphasize the role of the Catholic Church in promoting consensual marriage and neolocality from the ninth century onward. Bennett (2019) documents EMP features in England as early as 1250, and links them to rural poverty rather than economic opportunity. Regardless of its origins, the EMP was well established by the start of our study period in the sixteenth century (Hajnal 1965), yet remained far from uniform across regions (Dennison and Ogilvie 2014)—variation we seek to explain.

Because the EMP coincided with Europe’s Little Divergence (De Pleijt and Van Zanden 2016), understanding its local variation has important implications for long-run development. A central question is where did the EMP reflect female empowerment and where economic constraint. Some individuals possessed sufficient resources to marry but chose to remain celibate; others remained unmarried because they lacked the resources required to form an independent household—and these features likely varied across regions. For example, in England, Chelestria of Eywood

felt so strongly about not marrying that she paid two shillings in 1238 for the privilege of living ‘without a husband for her whole life.’ (Bennett 2019, p. 328).

In contrast, Helen Wiseman’s experience reflects involuntary celibacy. By 1278, Helen

returned to the village [Weston], where she was reported for being sexually active but not married. Helen was, by then, in her mid-twenties or older, but she was still not settled with husband and land [...] [For her] the reality was ‘No marriage, no land.’ (Bennett 2019, p. 334).

These contrasting experiences reflect a broader debate: one view links the EMP to economic development through female empowerment and human capital accumulation,¹³ while another sees it as a consequence of economic stagnation.¹⁴

In both views, marriage decisions hinge on access to resources. Neolocality—and more broadly the expectation that adults establish independent households separate from their parents—imposed large upfront costs, including access to land, housing, and furnishings (Horrell 2023), making inheritance central to household formation and delaying marriage until sufficient resources were accumulated (Hajnal 1982, p. 477). Lanzinger 2003b, p. 132 notes that “[s]ometimes the division of a house was a family strategy to enable another child to get married.” At the same time, inheritance rights provided financial independence, especially to women, and reduced reliance on marriage for economic security. As De Moor and Van Zanden (2010, p. 9) note, “if a woman had a right to her parent’s inheritance without having to marry,” there was “no financial incentive for an early marriage,” and women could “afford to wait before marrying”—or avoid marriage altogether. Sociologists have long argued that an “iron chain” links inheritance rules and marriage decisions (Lanzinger 2003b, pp. 130-131), yet data limitations have prevented systematic tests of inheritance’s role in the EMP. We address this gap by building a new atlas of inheritance at the level of judicial districts and towns, and examine whether local inheritance customs can explain where the EMP emerged through female empowerment and where through economic constraints.

2.2 Inheritance customs

In Ancien Régime Europe, customs were a primary source of law. They consisted of long-standing local rules derived from traditional practice that gradually acquired legal force (Gilissen 1979, p. 37). Customs were codified from the thirteenth century onward and gained official status in the fifteenth century in France and the sixteenth century in Belgium (Kim 2021, p. 64–91).¹⁵ By then, customs generally applied to fixed territories (judicial districts), although some towns had their own distinct customs. Throughout the paper, we refer to customs applying to judicial districts as rural customs, and to distinct customs applying to towns as urban customs. Customary law prevailed mostly in the northern half of France and in Belgium. In the south, customs coexisted with Roman law; although inheritance often fell under customary law (Poumarède 1972). Customs remained largely stable until the French Revolution, after which customary law was abolished and replaced by the French Civil Code (*Code Napoléon*) in both France and present-day Belgium (Gilissen 1979, p. 250).

Customs regulated many aspects, including marriage, parental authority, and inheritance. Inheritance laws governing immovable property were especially consequential, as they determined access to land—the main source of wealth for most households. By the late eighteenth century, 40 to 80 percent of households in France owned land and transmitted it across generations (Bourdieu, Kesztenbaum, and Postel-Vinay 2013; Gay, Gobbi, and Goñi 2026). Similarly,

¹³Carmichael, De Moor, and van Zanden (2011), Carmichael et al. (2015), Carmichael et al. (2016), Foreman-Peck (2011), De Moor and Van Zanden (2010), Van Zanden, De Moor, and Carmichael (2019).

¹⁴Dennison and Ogilvie (2014), Dennison and Ogilvie (2016), Palma, Reis, and Rodrigues (2021).

¹⁵Charles VII in France and Charles V in Belgium ordered the codification of customs to reduce judicial uncertainty regarding the content and territorial scope of the law (Grinberg 1997).

in Belgium 57 percent of families held a title in the land register by 1845 (Vanhaute 2001, p. 30), and peasant smallholders retained substantial landed property in inland Flanders throughout the Ancien Régime (Thoen and Soens 2015, p. 3).

Egalitarian inheritance—where assets were divided equally among children—coexisted with inegalitarian systems that excluded some children and/or discriminated against women, often concentrating property in a single heir. The origins of this variation remain unclear. A leading theory emphasizes that inegalitarian inheritance arises where land is the primary source of wealth and subject to indivisibilities (Bertocchi 2017). Alternative theories point to lineage survival (Chu 1991), economic uncertainty (Grieco and Ziebarth 2015), access to wood for house construction (Zink 1993), and scale economies or rent-seeking among heirs (Baker and Miceli 2005).

Motivated by these theories, we test whether areas with different inheritance rules in France and Belgium differ systematically across a broad set of covariates, including the main hypothesized determinants of inheritance systems. We consider soil and climatic characteristics shaping the economic value and indivisibility of land: total caloric yields and suitability for seven crops, pasture, and plow use (FAO, Galor and Özak 2016), as well as terrain ruggedness (Nunn and Puga 2012), precipitation, and temperature (Fick and Hijmans 2017). We also examine proxies for early economic development—Roman roads (McCormick et al. 2013); human capital—universities and academies established by 1750 (de la Croix 2026); religiosity—bishoprics established by 600, 900, 1000, 1200, and 1450 (Jedin, Latourette, and Martin 1987); and political turmoil—HiSCoD riots by 1750 (Chambru and Maneuvrier-Hervieu 2024).¹⁶ Finally, we compare the Geni coverage across inheritance areas to capture data biases and differential lineage survival. See Appendix C.3 for detailed descriptions of these variables and their sources.

Table 1 reports differences in these characteristics across judicial districts (or exclaves) with egalitarian versus inegalitarian inheritance. We also present balance tests for contiguous districts—those sharing a border but following different inheritance rules. Most coefficients are small, with the largest around one-tenth of a standard deviation. Only four of 50 balance tests are statistically significant at the 5 percent level. This is reduced to one in 25 among bordering districts, indicating that differences between egalitarian and inegalitarian areas disappear close to inheritance borders. Key variables—average caloric suitability for post-1500 crops, terrain ruggedness, precipitation, and temperature—are well balanced. This suggests that differences in inheritance systems are unlikely to reflect underlying variation in the economic value or indivisibility of land, two factors linked to the origins of inegalitarian inheritance (Bertocchi 2017).

This balance is consistent with the history of customary law and the dominant view on the origins of customary inheritance rules in France and Belgium. This view emphasizes that inheritance customs did not reflect local conditions as much as the laws of migrating groups—such as the Burgundians, Visigoths, Salian Franks, and Ripuarian Franks—that settled across the territory following the fall of the Western Roman Empire in 476—long before the first documented evidence for the EMP.¹⁷ As a result, inheritance systems are plausibly uncorrelated

¹⁶For these proxies, we count occurrences within a 10-kilometer radius of each birth location and average across judicial districts (or exclaves).

¹⁷See, e.g., Chénon (1926) for France and Gilissen (1979) for France and Belgium (pp. 155-8).

with later confounding factors for the EMP.

3 Data

This section describes the construction of a novel atlas of 2,486 rural and urban inheritance customs in Belgium and France. We then present individual-level genealogical data used to measure the local prevalence of the EMP and describe our main sample.

3.1 Atlas of inheritance in pre-industrial France and Belgium

We map inheritance rules at a highly disaggregated local level, combining rural and urban customs. We proceed in three steps: (i) constructing a geographic information system (GIS) of eighteenth-century judicial districts where customs applied; (ii) assigning the relevant rural custom to each judicial district and, where applicable, the urban custom to each town with its own custom; and (iii) coding the inheritance rules governing non-movable assets from the customs.

Judicial districts. For Belgium, we construct a new GIS of historical judicial districts. We rely on historical maps from the Moravian Library’s Moll’s Map Collection and three other sources (see Appendix Table C1). These maps comprise broad judicial regions (provinces, duchies, independent counties) and disaggregated judicial districts where customary law applied. We georeference these maps using the projection of Lambert’s 1972 sub-municipal and sub-commune boundaries (*Atlas de Belgique database*).¹⁸ To our knowledge, we are the first to map eighteenth-century judicial districts in the Low Countries.¹⁹ For France, we use judicial districts (*bailliages*) in 1789 from Gay, Gobbi, and Goñi (2024). The resulting map comprises 167 judicial districts in Belgium and 435 in France (Appendix Figure C1).

Customary regions and urban customs. In a second step, we assign a custom to each judicial district and to any town which had its own distinct custom. Many cities—particularly in the Low Countries—promoted equal inheritance, rejected primogeniture, and male privilege, even when embedded in regions following the opposite rules (Godding 1987, p. 322).

For Belgium, we use various compendia of customary laws—principally de Richebourg (1724)’s *Nouveau Coutumier Général* and the *Recueil des Anciennes Coutumes de la Belgique* (1867)—together with lists of localities by custom in Gilissen 1950, 1960, 1970, and 1979.²⁰ For France, we rely on Gay, Gobbi, and Goñi (2024)’s *Customary Atlas of Ancien Régime France* for rural customs, and identify urban customs as those explicitly named after a city in de Richebourg (1724)’s *Nouveau Coutumier Général* and not already listed in the *Atlas*.²¹ Both

¹⁸Specifically, we follow Gay, Gobbi, and Goñi (2024)’s methodology to manually trace historical borders and interpolate surfaces using the latitude and longitude of municipalities together with QGIS’s thin plate spline algorithm.

¹⁹Rombert (2023) constructs a historical atlas of the Low Countries in the 1500s. Our judicial districts roughly correspond to their third administrative level (ADM2), though our map covers the 1700s.

²⁰For an overview of Belgian customary law sources, see https://justice.belgium.be/sites/default/files/downloads/2021-01_recueils_et_coutumes.pdf.

²¹Cities include *villes*, *tailles*, *changles*, *banlieues*, *eschevinages*, *gouvernances*, and *advoueries*.

Table 1: Balancedness of egalitarian versus inequalitarian judicial districts.

Dependent Variable	All districts		Border districts		Dependent Variable	All districts		Border districts	
	Coef.	S.E.	Coef.	S.E.		Coef.	S.E.	Coef.	S.E.
Individuals in Geni main sample	-0.11	(0.11)	-0.17	(0.12)	Temperature, min	0.1*	(0.051)	0.07	(0.067)
Pasture suitability index	-0.18***	(0.06)	0.048	(0.085)	Temperature, max	-0.06	(0.04)	-0.07	(0.064)
Caloric suitability index	0.05	(0.05)	0.07	(0.072)	Temperature, average	0.03	(0.049)	0.02	(0.061)
Plow suitability index	0.03	(0.051)	0.03	(0.087)	Roman Roads in 10km	0.04	(0.038)	0.03	(0.032)
Wheat suitability index	-0.06	(0.054)	-0.09	(0.1)	Universities by 1750 within 10km	0.00	(0.063)	0.04	(0.14)
Barley suitability index	-0.13***	(0.049)	-0.11	(0.068)	Academies by 1750 within 10km	0.00	(0.063)	0.04	(0.14)
Oats suitability index	0.07**	(0.034)	0.11**	(0.053)	Bishoprics by 600 within 10km	-0.06	(0.13)	-0.05	(0.17)
Potato suitability index	0.01	(0.043)	0.05	(0.061)	Bishoprics by 900 within 10km	-0.01	(0.13)	-0.01	(0.17)
Cabbage suitability index	0.06*	(0.031)	0.09*	(0.049)	Bishoprics by 1000 within 10km	0.09	(0.08)	0.10	(0.12)
Carrot suitability index	0.08	(0.11)	-0.01	(0.13)	Bishoprics by 1200 within 10km	0.05	(0.11)	0.09	(0.16)
Chickpea suitability index	0.04	(0.054)	0.03	(0.09)	Bishoprics by 1450 within 10km	0.03	(0.08)	0.10	(0.14)
Ruggedness	0.02	(0.046)	0.02	(0.082)	Riots by 1750 within 10km	0.00	(0.063)	0.04	(0.14)
Precipitation	0.08	(0.052)	0.08	(0.066)					
N	1,007		396			1,007		396	
Region FE	Y		Y			Y		Y	

Note: This table shows estimates of β in $Y_{j,r} = \alpha + \beta \mathbf{1}[\text{Egalitarian}_j] + \mu_r + \epsilon_{j,r}$, where $Y_{j,r}$ is one of the 25 variables listed in the rows. Pasture suitability is described in Section 4, geographic and climatic variables are constructed by extracting raster values at each unique latitude-longitude location in the Geni dataset and averaging them within each judicial district and exclave (j), and variables “within 10 km” are constructed analogously but averaging over counts within 10 km rather than over raster values. $\mathbf{1}[\text{Egalitarian}_j]$ equals one in judicial districts (j) where inheritance was shared across offspring, including women, and zero otherwise; and μ_r are fixed effects for regions (r). Effects are in terms of standard deviations. The sample of judicial districts and exclaves here is larger than in our analysis below because (a) pasture suitability is not available for certain districts or exclaves and (b) some districts or exclaves have no women in the Geni dataset for our study period. The number of observations for pasture suitability is 995 in cols. 1 and 2, as data is not available for several districts. Region FE are *Généralité* for France, and provinces, independent counties, and duchies for Belgium. Robust SE; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

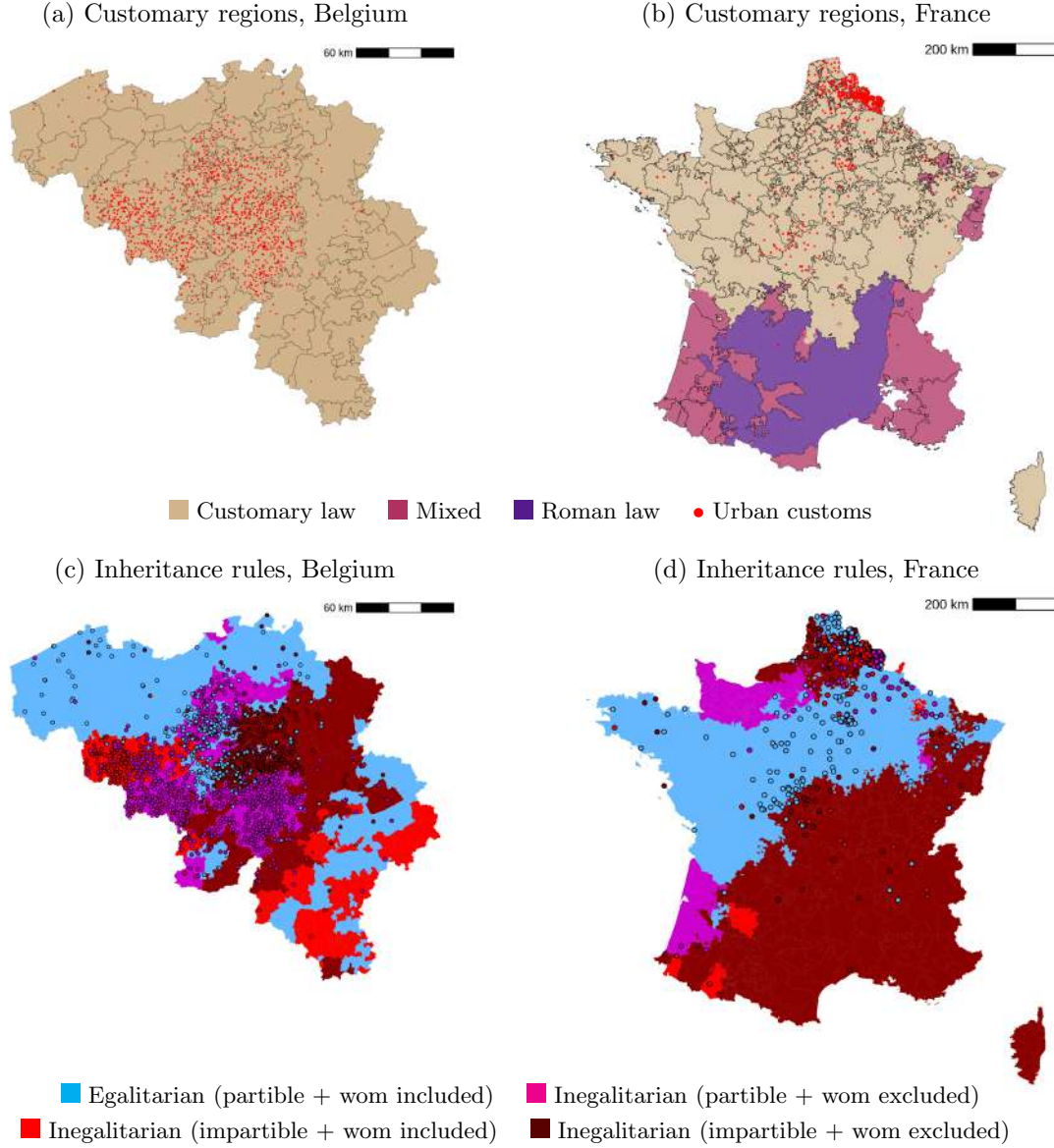


Figure 2: Customary regions and inheritance rules

Belgian and French sources distinguish local customs, which specified deviations from a general custom.²² We geocode urban customs using a combination of automated tools and manual searches.²³

Panels (a) and (b) of Figure 2 display the geographical distribution of customary regions: 59 rural customs for Belgium and 141 for France. Red dots indicate urban customs. In Belgium, customary law prevailed throughout, with substantial local variation across close-by localities. In southern France, Roman law was the main source of law (purple). However, in mixed areas (pink) customary and written law coexisted—with inheritance falling under customary law (Poumarède 1972).

²²For example, Abbeville follows the general custom of *Ponthieu* without deviation in inheritance rules, while Calais and its *banlieue* follow a custom of its own (de Richebourg 1724, p. 17 and 109).

²³We use www.geohack.toolforge.org and www.latlong.net for France, and Google Maps, OpenStreetMap, Wikipedia, and www.notrebelgique.net for Belgium.

Inheritance rules. In a third step, we classify the inheritance rules described in each custom. For Belgium, we read the texts of the 59 rural and 1,583 urban customs, coding inheritance rules over non-movable assets—mostly the family house or farm.²⁴ For France, we adopt the classification of Gay, Gobbi, and Goñi (2026). Our primary source is de Richebourg (1724)’s *Nouveau Coutumier Général*, supplemented by Meijers (1929, 1932, 1936) and Godding (1987, p. 317–350) for validation.²⁵ When an urban custom’s inheritance rule differs from the general custom it adhered to, we code it separately; otherwise we assign the general custom’s rule.

We classify inheritance rules into four categories: partible and impartible rules, and rules where women had the right to inherit or not. Under partible rules, family wealth was divided among several offspring relatively equally. Under impartible rules, parents could favor one child over others—e.g., through primogeniture, ultimogeniture, or unigeniture. Inheritance systems further varied in whether women could inherit or not, a dimension which previous scholars have not systematically mapped (Gay, Gobbi, and Goñi 2026). Throughout the paper, we refer to inheritance systems where family assets were divided among all children, including women, as *egalitarian*; and to inheritance systems following impartible rules and/or discriminating women as *inegalitarian*. This binary categorization is standard among customary laws scholars (Yver 1966).

Our final database contains 1,642 Belgian customs (1,583 urban) and 844 French customs (703 urban). Panels (c) and (d) of Figure 2 display our map of inheritance, separating rural custom regions (colored areas) and urban customs (dots). Egalitarian inheritance (light blue) dominated rural northern and western Belgium. The south and east were characterized by inegalitarian systems with partible rules excluding women (magenta) and with impartible rules favoring a male heir (dark maroon) or an heir of any gender (red). In France, egalitarian inheritance prevailed in the rural north-west, while the south-east was dominated by impartible systems excluding women. Both southern Belgium and northern France display substantial local variation. Urban customs frequently depart from the surrounding rural custom, which are generally more egalitarian (see Appendix Table C2 for details). The two countries diverge in how they depart from egalitarian inheritance: Belgian customs more often exclude women while keeping assets divisible, while French customs are more often impartible. That said, within inegalitarian areas, impartible rules and rules excluding women are strongly spatially correlated. The reason is that both rules aimed to prevent the dilution of family wealth among descendants (Yver 1966, p. 39).

3.2 Online genealogies in geni.com

We assemble a new, individual-level dataset of marriages and celibacy in France and Belgium from 1500 to 1750. We rely on genealogical records from www.geni.com, a MyHeritage Company. The main advantage of crowdsourced genealogies is their sheer scale and geographic coverage:

²⁴According to the custom of Uccle (article 39), everything that is not nailed down is a movable asset. We abstract from the nobility’s lands, fiefs, and other non-movable goods, which typically followed primogeniture regardless of the local custom.

²⁵The map in Godding (1987, p. 581) differs from ours in three ways: it relies on aggregate regions, while we use one map per province; it covers customs from the twelfth century onward, whereas we use each custom’s latest version; and it does not record whether women had the right to inherit or not.

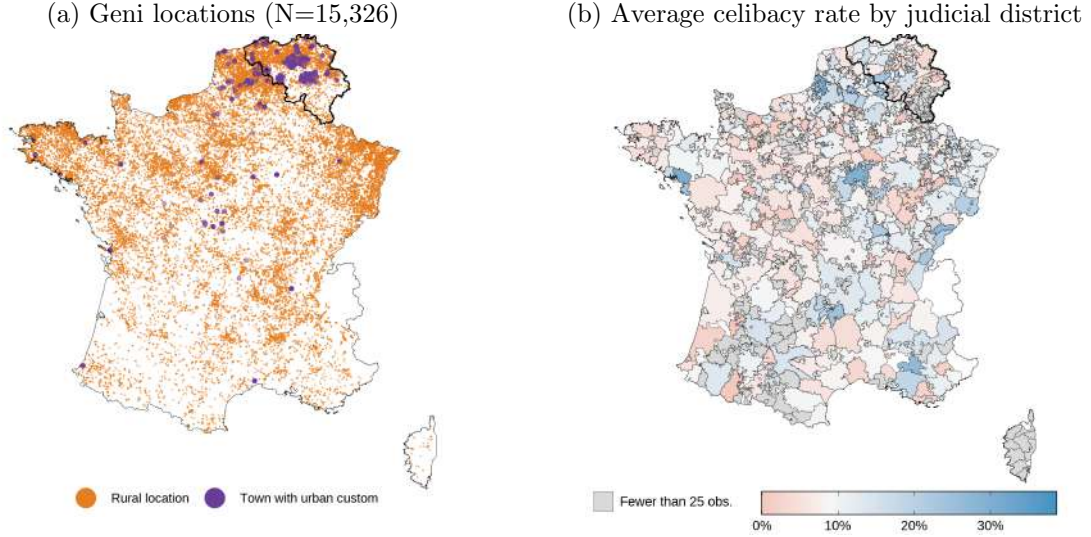


Figure 3: Demographic data from [Geni.com](https://www.geni.com)

Notes: The sample includes women born in France and Belgium in 1500–1750, who died after 40, and whose Geni records could be precisely geolocated. Rural locations are > 1 km from the centroid of an urban custom settlement; Towns with an urban custom are all locations within 1 km of an urban-custom centroid and with a population above 5,000 ([Buringh 2021](#)).

the underlying database contains more than 153 million profiles worldwide. Profiles typically report dates and places of birth, baptism, marriage, death, and burial, as well as family links to parents and spouses (see Appendix Figure C3).

Using information from Geni profiles, we reconstruct individual marriage histories and geolocate birthplaces.²⁶ This allows us to measure celibacy and age at first marriage—two key dimensions of the EMP—at the local level.

The resulting database covers France and Belgium at an unusually fine geographic scale, with 79,590 women born in 15,326 distinct locations (Figure 3, panel a). This spatial granularity provides a local view of the EMP, allowing us to move beyond national and broad regional comparisons in previous literature and, instead, study variation in the EMP across villages and local administrative units. Combined with our newly assembled granular GIS on judicial districts and inheritance customs, these data allow us to assign individuals to local inheritance practices and examine how these legal institutions shaped the EMP across space.

Our main outcome variable is female lifetime celibacy. Specifically, we define a woman as celibate if her family tree in www.geni.com lacks a spouse. To avoid classifying women who died young as celibate, we restrict the celibacy sample to individuals who died over age forty. This celibacy measure is akin to that used in the family-reconstruction method, which is based on marital status in death records ([Henry and Houdaille 1978](#)). We also examine male celibacy—constructed analogously—as well as female and male age at first marriage.

A number of potential biases can emerge from crowdsourced genealogies created by amateur

²⁶Our geocoding relies on the geographic variables reported in each Geni profile. We first retain profiles whose birth location contains the terms France, Belgium, or equivalent variants. We then assign birth coordinates (latitude and longitude) using the open-source Photon geocoder (<https://photon.komoot.io/>). Using these coordinates, we link individuals to their judicial district and customary region of birth. Finally, we drop observations with missing coordinates, coordinates outside France or Belgium, or birth locations reported only at a higher level of aggregation than a city or village.

genealogists. We construct quality filters addressing three of the most common biases—false-positive links, patrilineal bias, and survival bias. We then show that our stylized facts are robust to restricting the sample to profiles satisfying each of these quality filters. Here we briefly describe the biases and quality filters; see Appendix C.2 for more details.

First, we address *false-positive links*. A genealogist may incorrectly link an ancestor to birth, marriage, or death records of another individual bearing the same name; or the trees of two unrelated families bearing the same surname may be incorrectly merged. To address this bias, we use a quality filter restricting the sample to individuals with below-median surname frequency (henceforth, *rare names*); who are less likely to be incorrectly linked. Second, to address *patrilineal bias*—whereby genealogists trace only direct paternal ancestors—we use the horizontal lineage restriction of Blanc (2022) (henceforth, *h-sample*). This quality filter retains individuals with collateral ancestors, that is, trees with at least one individual in the preceding four generations who had two or more children recorded (see Appendix Figure C6). Third, we address *survival bias*—the overrepresentation of high-fertility individuals who are more likely to leave a descendant who becomes an amateur genealogist and reconstructs the family tree. To do so, we consider a quality filter that retains individuals who are unlikely to be direct ancestors of a genealogist (henceforth, *off main line*).²⁷ By construction, the off-main-line sample exhibits higher celibacy because individuals with descendants are less likely to satisfy the filter. Overall, results are remarkably similar across filters, likely because requiring a precise geolocation already imposes a stringent quality filter.

In addition, we assess the quality of the Geni data by comparing it to two high-quality sources from France: the Henry parish family reconstitution dataset (Henry and Houdaille 1978), and the TRA sample of estate declaration records for individuals whose surname starts by the letters “Tra” (Bourdieu, Kesztenbaum, and Postel-Vinay 2013). Figure 4 compares crude celibacy rates for women and men born in France across the Geni, TRA, and Henry datasets, by death decade. Celibacy estimates are similar across datasets, particularly for women and men dying after 1800. Before 1800, the Henry dataset shows smaller female celibacy rates than both Geni and Dennison and Ogilvie (2014)’s estimates for France (12 percent). This likely reflects underreporting of celibacy due to missing marital records for 20–60% of individuals (see Appendix Figure C4).

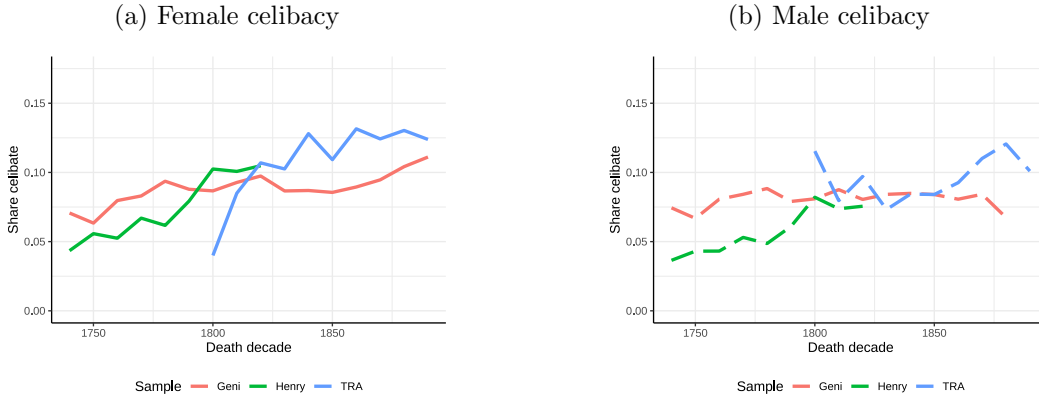
3.3 Other data sources

Historical population data. We use data from Buringh (2021) on the location and population of European towns in 1700. In detail, we define towns with an urban custom as all locations with a Buringh population over 5,000 that are within 1 kilometer of an urban custom centroid. Town population is also used in robustness checks for Fact 2 (urban customs).

Proxies for women’s economic opportunities. We use two local-level measures of women’s economic opportunities. The rationale for these measures is discussed in detail in Section 4. The first measure is the pasture suitability index (PSI) developed by the Food and Agriculture

²⁷Specifically, this filter retains individuals (i) who have no great-great-grandchildren but (ii) whose parents have at least one grandchild (see Appendix Figure C7). This excludes likely direct ancestors of amateur genealogists today, while avoiding trees with invisible direct ancestors due to incomplete sibling-to-spouses linkages.

Figure 4: Comparing Geni to other datasets



Notes: An individual is celibate if she/he was unmarried after age 40 (Geni) or at death (TRA; Henry). Individuals with missing marital status are dropped from the TRA and Henry samples.

Organization (FAO). The index is based on climatic and soil characteristics in 5 arc-minute grid cells (approximately 10 kilometers) and ranges from zero (lowest) to one (highest) pasture suitability. We construct judicial-district-level measures by averaging PSI values over the area of each judicial district territory and each exclave (see Panel A of Appendix Figure C5). Because this measure captures women’s labor market access in the primary sector, its use is restricted to rural areas. The second measure is the proximity to a beguinage. Beguinages were religious communities of single women in the Low Countries and northern France. We use data from Frigo and Roca Fernández (2022) on the location of beguinages open until at least 1670 (see Panel B of Appendix Figure C5).

3.4 Main sample

Our main sample includes 70,728 women born in rural custom regions and 4,964 women born in towns with an urban custom. Our data spans three centuries, from 1500 to 1750—the last cohorts to complete their reproductive cycle before the French Revolution eradicated local inheritance customs in 1793 (Gay, Gobbi, and Goñi 2026). We exclude women whose Geni record could not be precisely geolocated. To examine definite celibacy, the sample excludes women who died before age 40; to examine age at marriage, we also exclude women who were celibate or married outside reproductive age (15 to 35).

Appendix Table C3 reports summary statistics. The data reflect the key features of the EMP: Lifetime celibacy is 10 percent in rural areas and 9 percent in urban areas, consistent with Dennison and Ogilvie (2014)’s estimates for France, which cluster around 12 percent. The average age at first marriage is 23.9 in rural areas and 24.7 in urban areas, close to Flinn (1981)’s estimate of 25 in seventeenth century France and Belgium. In addition, consistent with previous sub-national analyses of the EMP (Dennison and Ogilvie 2014; Perrin 2022), we document substantial spatial heterogeneity in celibacy rates across judicial districts—sometimes ranging from near zero to over 30 percent in neighboring districts (see panel (b) of Figure 3).

The sample is balanced in terms of inheritance: 54 percent (60 percent) of rural (urban) women were under egalitarian inheritance. The average pasture suitability is 0.71 in rural areas.

Roughly 20 percent (41 percent) rural (urban) observations are from Belgium. Panels B–D restrict the sample using three quality control filters addressing false-positive links, patrilineal bias, and survival bias in crowdsourced genealogies. Most descriptives are similar, supporting the Geni data’s credibility. The main exception is that celibacy is mechanically higher in the off-main-line and h-samples.

4 Stylized facts about inheritance and the EMP

This section documents four stylized facts about inheritance institutions and the EMP. In rural and urban areas, inheritance institutions affect marriage outcomes in opposite ways. The relationship between earning opportunities and the EMP also depends on the inheritance regime. Finally, these patterns are stable over time. Together, these facts point to two mechanisms—female empowerment and financial constraints—that shaped the EMP.

Fact 1. *In rural areas, celibacy and age at first marriage are lower under egalitarian inheritance.*

Although a growing literature has shown that the EMP was far from uniform across Western Europe’s social groups (de la Croix, Schneider, and Weisdorf 2019) and regions (Dennison and Ogilvie 2014; Perrin 2022), the sources of this regional variation remain largely unexplored. We document that variation in the EMP reflects variation in local inheritance rules, which shaped who could afford to marry and at what age. Specifically, our first stylized fact is that, in rural areas, celibacy and age at first marriage were lower in egalitarian inheritance regions.

This relationship is explained by the fact that, under the EMP, marriage required forming a neolocal household. Because establishing an independent household away from one’s parents required land, a dwelling, and furniture, access to inheritance was central to marriage decisions. In inequalitarian areas, where only a subset of offspring inherited property, fewer individuals could establish independent households, resulting in higher celibacy and later marriage. In contrast, in egalitarian areas—where property was shared across children, including women—access to household formation was broader, lowering financial barriers to marriage and reducing both celibacy and age at first marriage.

To document this relationship, we estimate the following fixed-effects specification:

$$Y_{i,j,t,r} = \alpha + \beta \mathbf{1}[\text{Egalitarian}_j] + \mu_t + \mu_r + \epsilon_{i,j,t,r} , \quad (1)$$

where i indicates women, t birth decades, j judicial district of birth, and r larger geographical regions.²⁸ The dependent variable $Y_{i,j,t,r}$ is either an indicator equal to one if a woman remained celibate throughout her life or her age at first marriage. $\mathbf{1}[\text{Egalitarian}_j]$ equals one in judicial districts where inheritance was shared across offspring, including women, and zero otherwise. The fixed effects μ_t and μ_r absorb cohort and regional differences in marriage patterns. The coefficient of interest, β , captures the difference in celibacy (or age at marriage) between egalitarian and inequalitarian areas.²⁹

²⁸Regions are larger administrative divisions than judicial districts (see Appendix Figure C2). Regions comprise *Généralité* for France, and provinces, independent counties, and duchies for Belgium.

²⁹In the fixed-effects specifications for Facts 1–3, we present heteroskedasticity-robust standard errors, account

Table 2: Inheritance and the EMP in rural areas, fixed-effects estimates.

	All (1)	Rare names (2)	H-sample (3)	Off main line (4)
<i>Panel A. Dep. variable = 1 if celibate</i>				
Egalitarian inheritance	−0.026*** (0.004)	−0.016*** (0.005)	−0.019** (0.009)	−0.057*** (0.010)
Mean dep. variable	0.10	0.08	0.22	0.23
Effect size (β/mean)	−0.26	−0.21	−0.09	−0.25
N	70,728	37,312	31,925	26,284
<i>Panel B. Dep. Variable is age at first marriage</i>				
Egalitarian inheritance	−0.189*** (0.070)	−0.243** (0.095)	−0.125 (0.103)	−0.250** (0.116)
Mean dep. variable	23.83	23.82	23.90	24.34
Effect size (β/mean)	−0.01	−0.01	−0.01	−0.01
N	58,794	30,530	27,011	20,764
Decade FE	Y	Y	Y	Y
Birth region FE	Y	Y	Y	Y

Notes: The sample is women born in 1500–1750 in rural custom regions, whose Geni record can be geo-located, and who died after 40. Panel A examines definite celibacy. Panel B examines age at first marriage among women who married during reproductive age (15 to 35). Quality filters in columns (2)–(4) are defined in Section 3.2. Rural custom regions are > 1 km from the centroid of an urban custom settlement. Birth region fixed effects comprise *Généralité* for France, and provinces, independent counties, and duchies for Belgium (see Appendix Figure C2). Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 2 reports estimates of Equation (1). Panel A uses lifetime celibacy as the dependent variable; Panel B uses age at first marriage. Column (1) uses our baseline sample of approximately 70,000 women born in France or Belgium between 1500 and 1750, whose Geni profiles are precisely geolocated and who were subject to rural inheritance customs.³⁰ To measure definite celibacy, the sample excludes women who died before age 40; the marriage-age sample further excludes celibate women and women who married outside reproductive age (15 to 35). Columns (2)–(4) apply increasingly stringent quality filters addressing survival bias, patrilineal bias, and false-positive links in crowdsourced genealogies.

Egalitarian inheritance is associated with lower lifetime celibacy and earlier marriages. Column (1) shows that women born in egalitarian rural areas were 2.6 percentage points less likely to remain celibate than women in inegalitarian areas. Relative to an average celibacy rate of 10 percent, this corresponds to a 26 percent lower probability of never marrying. Women in egalitarian areas also married 0.189 years earlier on average, approximately a 1 percent reduction. Although smaller in magnitude, the effect on marriage age is consistent with the reduction in celibacy. The estimates remain stable across the rare names sample (column 2), the h-sample (column 3), and the off-the-main-line sample (column 4), and all but one estimate remain statis-

for different degrees of spatial correlation in the error terms, and present cluster-robust standard errors by four different geographic levels at which treatment assignment varies (see Section 4.1).

³⁰We define rural custom regions as locations more than one kilometer from the centroid of an urban custom settlement. Results are robust to alternative cutoffs (see Appendix Tables A17 to A19).

tically significant. These results indicate that the relationship between inheritance institutions and marriage outcomes is not driven by common biases in crowdsourced genealogies.

We further disaggregate inegalitarian systems into three categories: impartible systems including women, impartible systems excluding women, and partible systems excluding women. The results show that the egalitarian-inegalitarian difference is largely driven by systems that exclude women from inheritance (see Appendix Table A2). This finding underscores the central role of women’s access to property in shaping marriage outcomes under the EMP.

Although our primary objective is to document, in a descriptive manner, the association between the EMP and local inheritance customs, we also plausibly address concerns about causality and omitted variables. Specifically, one concern is that inegalitarian inheritance may have emerged in areas with geographic constraints—such as land indivisibilities or farming conditions—that also affected marriage decisions in a Malthusian economy. More broadly, historical experiences or economic characteristics correlated with inheritance institutions could confound the relationship between inheritance and celibacy.

In our setting, these concerns are mitigated by three factors. First, the historical evidence shows that regional differences in customary law in France and Belgium largely trace back to the legal traditions of Germanic peoples after the fall of the Roman Empire in 476, rather than to geographic or economic conditions (see Section 2.2). Second, Table 1 shows that, consistently with this historical evidence, areas with egalitarian and inegalitarian inheritance are mostly balanced on a large set of geographic and land characteristics, religious variables, educational institutions, and political variables. Third, we included fixed effects for administrative regions above judicial districts; i.e., *Généralité*, provinces, independent counties, or duchies (see Appendix Figure C2). Hence, the identifying variation comes within geographically close localities within the same region.

To further address omitted-variable concerns, we implement a cross-border fixed-effects design (Dube, Lester, and Reich 2010; Moscona, Nunn, and Robinson 2020). We compare celibacy and age at marriage within pairs of contiguous judicial districts straddling a common border, where on one side of the border inheritance is egalitarian, and on the other side inheritance is inegalitarian. Figure 5 illustrates this setup, displaying the sample of 383 judicial districts and exclaves that lie along the egalitarian-inegalitarian inheritance border. By focusing on pairs of adjacent districts, this strategy increases comparability of egalitarian and inegalitarian inheritance areas (see Table 1 for balance). In detail, it accounts for unobserved characteristics that vary smoothly across space—such as soil characteristics, land values, historical experiences, the north-south divide in Roman law, or how much the rule of law prevailed.

Our cross-border fixed-effects specification takes the form:

$$Y_{s,p,r} = \alpha + \beta \mathbf{1}[\text{Egalitarian}_s] + \mu_p + \mu_r + \epsilon_{s,p,r} , \quad (2)$$

where s denotes the main territory of a judicial district or a judicial district exclave, p a pair of contiguous districts with different inheritance rules, and r larger geographical regions. The estimation sample is restricted to judicial districts (and exclaves) located along the inheritance border. Because exclaves may differ geographically from their main territory, we treat them as separate observations. Regressions are weighted by the number of women with Geni profiles

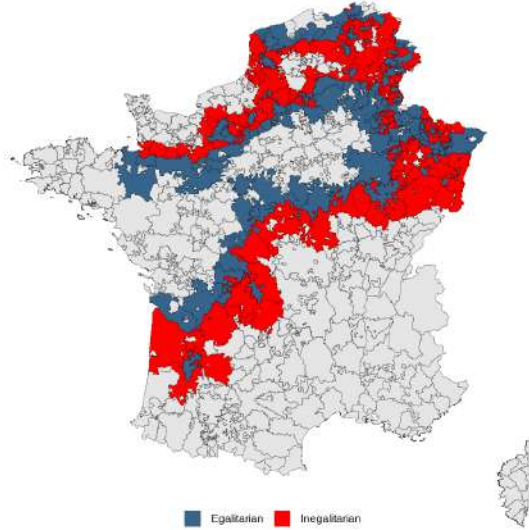


Figure 5: Contiguous cross-border pairs.

Notes: This figure displays the geographic distribution of bordering judicial districts, where one district has egalitarian (blue) and the other inegalitarian (red) inheritance. Exclaves are treated as separate units forming their own cross-border pairs.

in each s , accounting for the fact that the data coverage is generally small in exclaves.³¹ The dependent variable, Y , is either the average female celibacy rate or the average female age at first marriage in s . The fixed effects μ_p absorb all characteristics shared by each pair of contiguous districts, while μ_r absorb broad regional differences in marriage patterns within the cross-border sample. Hence, the effect of egalitarian inheritance is identified from within-pair differences in celibacy and age at marriage between adjacent districts that differ in their inheritance regime, after absorbing broader regional heterogeneity. Some judicial districts border multiple districts with different inheritance regimes and therefore appear in more than one pair. We account for the repeated appearance of some districts by reporting two-way clustered standard errors by pair (p) and judicial district (s).

Table 3 reports estimates of Equation (2). In column (1), the average celibacy rate and age at first marriage in each judicial district or enclave are calculated among women born in 1500–1750, who were subject to rural customs, whose Geni records can be precisely geolocated, and who died after age 40. For age at first marriage, we exclude celibate women and women marrying outside reproductive age (15 to 35). In columns (2)–(4), the average celibacy rate and age at first marriage are calculated over women satisfying the quality filters addressing common biases in crowdsourced genealogies.

Across specifications, egalitarian inheritance is associated with lower lifetime celibacy and earlier marriages. Column (1) shows that celibacy and age at marriage fall by 1.4 percentage points and 0.286 years across neighboring judicial districts with different inheritance systems, respectively. This correspond to a 17-percent and a one-percent reduction relative to the mean. These magnitudes are qualitatively and quantitatively similar to the baseline fixed-effects esti-

³¹Although separating exclaves from the main territory increases the number of pairs, the weights ensure that these observations do not drive our results.

Table 3: Inheritance and the EMP in rural areas, cross-border fixed-effects estimates.

	All (1)	Rare names (2)	H-sample (3)	Off main line (4)
<i>Panel A. Dep. var. is female celibate rate in judicial district or exclave</i>				
Egalitarian inheritance	−0.014*** (0.005)	−0.012** (0.006)	−0.007 (0.012)	−0.050*** (0.014)
Mean dep. variable	0.08	0.07	0.20	0.19
Effect size (β/mean)	−0.17	−0.17	−0.04	−0.26
N	918	828	714	730
Pairs / Districts	459 / 383	414 / 351	357 / 305	365 / 314
<i>Panel B. Dep. var. is average female age at first marriage in judicial district or exclave</i>				
Egalitarian inheritance	−0.286** (0.132)	−0.284*** (0.108)	−0.260 (0.277)	−0.406* (0.209)
Mean dep. variable	24.18	24.22	24.28	24.62
Effect size (β/mean)	−0.01	−0.01	−0.01	−0.02
N	832	746	618	602
Pairs / Districts	416 / 348	373 / 317	309 / 265	301 / 261
Pair FE	Y	Y	Y	Y
Birth region FE	Y	Y	Y	Y

Notes: The sample comprises judicial districts (and exclaves) belonging to cross-border pairs with different inheritance rules, weighted by number of female Geni profiles. Average celibacy and age at first marriage in a judicial district or an exclave is based on women born in rural custom areas in 1500–1750, who died after 40, and whose Geni records could be precisely geolocated. For age at first marriage, we exclude celibate women and women who married outside reproductive age (15 to 35). The sample of pairs is smaller because some districts or exclaves have celibate women but do not have women over which to calculate average age at first marriage. Quality filters in columns (2)–(4) are defined in Section 3.2. Two-way clustered standard errors by judicial district and by pair are reported in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

mates. The results remain broadly stable across alternative quality filters, with the exception of the horizontal sample restriction for patrilineal biases. Taken together, the cross-border evidence suggests that Fact 1 is unlikely to be driven by omitted variables, as long as these vary smoothly across space.

Overall, Fact 1 is consistent with the view that, in some regions, the EMP reflected financial constraints (Dennison and Ogilvie 2014). Under unequal inheritance, celibacy was high and marriage was delayed because only a subset of offspring inherited property, limiting their ability to form independent households. In egalitarian regions, property was more broadly shared, easing these constraints and lowering celibacy and marriage age.

If financial constraints were the only mechanism behind the EMP, however, greater economic opportunity should uniformly reduce celibacy and age at marriage. We now turn to urban areas (Fact 2) and to women’s access to rural labor markets (Fact 3) to test this prediction. We show that the effect of economic opportunity on the EMP is not uniform but depends on the inheritance regime and that, in many contexts, the EMP reflected female empowerment rather than constraint.

Fact 2. *In urban areas, celibacy is higher under egalitarian inheritance.*

Urban areas differed from rural regions in their economic structure. Compared to agrarian settings, towns were more commercialized and featured diversified labor markets with wage employment and service occupations accessible to women (De Moor and Van Zanden 2010; De Pleijt and van Zanden 2021). Although guild restrictions (Ogilvie 2014) limited women’s role in crafts, women in cities worked as domestic servants, wet nurses, as innkeepers, and in retail (Goldberg 1997; Bellavitis and Boscolo 2018). Accordingly, cities which, like Ypres, offered more of such employment opportunities attracted a larger share of single women than cities which, like Bruges, specialized in luxury industries where female employment was limited (Stabel 2015). After the Black Death, cities appear to have offered women greater opportunities, as English Poll Tax records (1377, 1379, 1381) show that women migrated from rural to urban areas in larger numbers than men (Goldberg 1990). Urban and rural areas also differed in their demographic patterns, with (Lynch 1991, p. 83) classing cities as “an exaggerated version of the EMP.”

We document that, in this setting, celibacy was higher under egalitarian inheritance—the opposite pattern of Fact 1. The opposite effects in urban and rural areas suggest that in more commercialized economies, with wage-employment opportunities for women, inheritance rights strengthened women’s outside options to marriage. Instead, where women lacked access to inheritance marriage remained the primary source of economic security. Hence, in such urban settings, the EMP likely reflected female empowerment rather than financial constraints. This is consistent with De Moor and Van Zanden (2010)’s hypothesis for more commercialized, urban areas in north-west Europe.

To document this fact, we estimate Equation (1) on women born in towns with more than 5,000 inhabitants and their own urban custom. Table 4 reports the results. In contrast to rural areas, egalitarian inheritance is associated with higher lifetime celibacy (Panel A). Column (1) shows that women were 4.9 percentage points more likely to remain celibate in towns with egalitarian versus inegalitarian customs. The estimates remain stable across quality filters (columns 2–4). The magnitudes are economically meaningful: they correspond to a 36–54 percent increase in celibacy relative to the mean across specifications. By contrast, we find no meaningful effects on age at marriage (Panel B), with estimates close to zero. This suggests that the effect operates primarily on the extensive margin: higher celibacy does not reflect delayed marriage but a greater likelihood of remaining unmarried.

Although large cities often developed their own customs, many smaller towns also featured independent customs. The results are robust to controlling for town population and for interactions between population and the egalitarian inheritance indicator (Appendix Table A3).³²

Overall, Fact 2 indicates that in economically developed urban regions the EMP reflected empowered celibacy rather than financial constraint (De Moor and Van Zanden 2010). Under inegalitarian inheritance, celibacy was low because marriage was women’s primary source of economic security. Where women inherited property, greater financial independence—combined with access to labor markets—enabled them to remain unmarried. We next examine regional variation in women’s labor market opportunities to show that this empowerment channel was

³²Appendix Table A3 also shows robustness to controlling for the distance between birthplace and urban custom centroid, and for interactions between distance and the egalitarian indicator.

Table 4: Urban inheritance customs and the EMP, fixed-effects estimates.

	All (1)	Rare names (2)	H-sample (3)	Off main line (4)
<i>Panel A. Dep. variable = 1 if celibate</i>				
Urban custom is egalitarian	0.049*** (0.014)	0.036** (0.016)	0.080*** (0.026)	0.062** (0.025)
Mean dep. variable	0.09	0.07	0.19	0.17
Effect size (β/mean)	0.53	0.54	0.42	0.36
N	4,844	2,843	2,339	2,164
<i>Panel B. Dep. Variable is age at first marriage</i>				
Urban custom is egalitarian	0.080 (0.227)	−0.197 (0.306)	0.457 (0.325)	0.080 (0.346)
Mean dep. variable	24.78	24.69	24.74	25.22
Effect size (β/mean)	0.00	−0.01	0.02	0.0+
N	3,915	2,233	1,926	1,718
Decade FE	Y	Y	Y	Y
Birth region FE	Y	Y	Y	Y

Notes: The sample is women born in towns with an urban custom in 1500–1750 whose Geni record can be geo-located, and who died after 40. Panel A examines definite celibacy. Panel B examines age at first marriage among women who married during reproductive age (15 to 35). Quality filters in columns (2)–(4) are defined in Section 3.2. Towns with an urban custom are all locations within 1km of urban custom centroid with a population over 5,000 (Buringh 2021). Birth region fixed effects comprise *Généralité* for France, and provinces, independent counties, and duchies for Belgium (see Appendix Figure C2). Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

not confined to cities but also operated in rural areas with egalitarian inheritance.

Fact 3. *Women’s labor market opportunities strengthen the EMP under egalitarian inheritance but weaken it under inegalitarian inheritance.*

In rural areas, the relationship between the EMP and economic opportunities is U-shaped. Celibacy is high among women who can neither access labor markets nor inheritances, but also among women with both labor market opportunities and inheritance rights. Similar U-shaped patterns—for example between celibacy and education—have been documented in modern settings (Baudin, de la Croix, and Gobbi 2020); we show they were already present in the EMP.

This pattern reflects the coexistence of constrained and empowered celibacy. Under inegalitarian inheritance, limited access to inherited property tightens constraints on marriage and household formation, so celibacy and the EMP emerge where women lack labor market opportunities to cover the costs of forming a new household. Under egalitarian inheritance, access to property increases women’s financial independence, empowering them to remain unmarried—especially for high-income women with labor market access, whose opportunity cost of marriage is high.

To document this fact, we consider the following equation:

$$Y_{i,j,t,r} = \gamma \text{WLO}_i + \mu_t + \mu_r + \epsilon_{i,j,t,r} , \quad (3)$$

where i indexes women, t birth decades, j judicial districts, and r larger regions. $Y_{i,j,t,r}$ is either

celibacy or age at first marriage, and μ_t and μ_r denote cohort and region fixed effects. The coefficient γ captures how the EMP varies with women’s labor market opportunities.

We proxy women’s labor market opportunities, WLO_i , using two local measures. First, we use pasture suitability. First, we use pasture suitability. We measure it using the pasture suitability index (PSI) developed by the FAO, averaged over the area of district or exclave j . This is our preferred measure because Hajnal’s original model of family formation explicitly linked the EMP to pastoral activity and husbandry, hypothesizing positive gradients in the aggregate (Hajnal 1982, p. 450, 453, 473, 478). That said, Appendix D provides a detailed historical and empirical validation of this proxy for women’s labor market opportunities. In short, historical evidence shows that animal husbandry—particularly dairying and service in pastoral farms—was one of the main sources of paid rural employment for women in pre-modern Europe (Kusmaul 1981; Voigtlander and Voth 2009). As Whittle (2005, p. 53) notes, “pastoral regions employed more female servants than arable areas.” In her study of farms in rural France in the sixteenth to eighteenth centuries, Beauvalet (2005, p. 89-102) shows that “there was a genuine division of labor” where “men worked in the fields” and women were “responsible for the cows, pigs, and all the poultry in the farm.” Consistent with these patterns, Whittle and Hailwood (2020) analyze 536 agricultural tasks from court records in early-modern England and show that women were heavily concentrated in livestock-related activities: they performed 94.6 percent of milking tasks but only 2.2 percent of ploughing tasks (see Appendix Figure D1). We further validate our proxy using newly digitized 1830s wage data from the Belgian agricultural census, showing that areas with higher pasture suitability had significantly lower gender wage gaps (see Appendix Table D1). Because it is based on climatic and soil characteristics, pasture suitability provides plausibly exogenous variation in women’s labor market opportunities.

Second, we use the distance between woman i ’s birthplace and the nearest Beguinage. Beguinages were women-only communities prevalent in the Low Countries and northern France from the thirteenth to the nineteenth century. They provided education and financial protection to single women without imposing poverty vows, allowing women to work and accumulate labor income (Frigo and Roca Fernández 2022). Beguinages therefore expanded economic opportunities for single women.

To allow the gradient between women’s labor market opportunities and the EMP to differ across inheritance systems, we estimate the following fully interacted version of Equation (3), in which indicators for egalitarian and inegalitarian inheritance are interacted with every included variable:

$$Y_{i,j,t,r} = \sum_{k \in \{0,1\}} \mathbf{1}[\text{Egalitarian}_j = k] \times \{\gamma_k WLO_i + \mu_{k,t} + \mu_{k,r}\} + \epsilon_{i,j,t,r}, \quad (4)$$

This specification is equivalent to estimating Equation (3) separately in egalitarian- and inegalitarian-inheritance areas. The coefficients γ_1 and γ_0 therefore capture how the EMP responds to women’s labor market opportunities under egalitarian and inegalitarian inheritance, respectively. We report these coefficients together with a test of the null hypothesis $\gamma_0 = \gamma_1$.

Table 5 reports estimates of Equation (4) using pasture suitability as a proxy for women’s labor market opportunities in rural areas. Columns (1)–(4) examine celibacy; columns (5)–(8)

Table 5: Women’s labor market opportunities and the EMP, fixed-effects estimates.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	<i>Dep. Variable = 1 if celibate</i>				<i>Dep. Variable: age at first marriage</i>			
	All	Rare names	H-sample	Off main line	All	Rare names	H-sample	Off main line
<i>A. Inegalitarian inheritance</i>								
Pasture suitability	−0.107*** (0.018)	−0.108*** (0.022)	−0.178*** (0.036)	−0.244*** (0.041)	0.480* (0.286)	0.573 (0.383)	0.295 (0.442)	0.260 (0.509)
<i>B. Egalitarian inheritance</i>								
Pasture suitability	0.055** (0.023)	0.057** (0.028)	0.001 (0.047)	0.161*** (0.051)	1.447*** (0.372)	1.568*** (0.521)	1.723*** (0.565)	1.307** (0.638)
<i>p</i> -val. ineq.= egal.	0.000***	0.000***	0.003***	0.000***	0.039**	0.124	0.046**	0.200
Decade FE	Y	Y	Y	Y	Y	Y	Y	Y
Birth region FE	Y	Y	Y	Y	Y	Y	Y	Y
Mean dep. variable	0.10	0.08	0.22	0.23	23.83	23.83	23.9	24.34
N	70,717	37,306	31,922	26,280	58,777	30,520	27,007	20,753

Notes: The sample is women born in 1500–1750 in rural custom regions, whose Geni record can be geo-located, who died after age 40, and whose birthplace is covered by the data on pasture suitability. Columns 1–4 examine definite celibacy. Columns 5–8 examine age at first marriage among women who married during reproductive age (15 to 35). Quality filters in columns (2)–(4) and (5)–(8) are defined in Section 3.2. Pasture suitability is the average PSI values over the area of each judicial district territory and each exclave. Rural custom regions are > 1 km from the centroid of an urban custom settlement. Birth region fixed effects comprise *Généralité* for France, and provinces, independent counties, and duchies for Belgium (see Appendix Figure C2). Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

age at first marriage. We report the estimated effect of pasture suitability separately for inegalitarian (Panel A) and egalitarian inheritance regimes (Panel B), along with a test of equality between the two effects. Columns (1) and (5) use our baseline sample of rural women born in France or Belgium between 1500 and 1750. Columns (2)–(4) and (6)–(8) apply increasingly stringent quality filters.

Women’s labor market opportunities have opposite effects on the EMP across inheritance regimes. Under inegalitarian inheritance (Panel A), pasture suitability reduces celibacy. In the baseline specification (column 1), a one standard deviation increase in pasture suitability (0.14) lowers celibacy by 1.5 percentage points, relative to a mean of 10 percent. This indicates that improved labor market access for women relaxes financial constraints on marriage and weakens the EMP. Under egalitarian inheritance (Panel B), the relationship reverses. A one standard deviation increase raises celibacy by 7.7 percent relative to the mean. Stronger labor market opportunities thus enable women to remain celibate, and hence, strengthen the EMP through female empowerment. Age-at-marriage results mirror this pattern: pasture suitability delays marriage under egalitarian inheritance but has smaller and less stable effects under inegalitarian inheritance.

A test for the equality of coefficients shows that differences across regimes are statistically significant in all specifications for celibacy. Overall, the evidence supports the coexistence of constrained and empowered celibacy in rural areas. Under inegalitarian inheritance, higher pasture suitability is associated with lower celibacy, indicating that the EMP was most pronounced where women lacked both inheritance and labor market access. Under egalitarian inheritance,

the relationship reverses: high celibacy—and thus the EMP—manifested among women with access to both inheritance and labor markets.

Table 6 presents analogous estimates using proximity to a Beguinage as an alternative proxy for women’s economic opportunities outside marriage. Because Beguinages only existed in the Low Countries and northern France, the sample is restricted to women born within 25 kilometers of these institutions. Similarly, because Beguinages targeted single women, we focus on celibacy outcomes. Consistent with the pasture results, proximity to a Beguinage has opposite effects across inheritance regimes. Under inegalitarian inheritance, proximity reduces celibacy (Panel A); under egalitarian inheritance, it increases celibacy (Panel B). The differences are statistically significant across specifications.

To address endogeneity concerns, we also estimate Equation (4) on the border sample, that is, restricting the sample to women born in contiguous judicial districts and exclaves with different inheritance rules (see Figure 5).³³ By focusing on women born close to, but on opposite sides of the inheritance border, this specification accounts for unobservable factors that vary smoothly across space. The baseline findings are also visible in the border sample: our proxy for women’s labor opportunities, pasture suitability, increases celibacy under egalitarian inheritance, and reduces it under inegalitarian inheritance (see Appendix Table A4). This effect operates primarily on the extensive margin: pasture suitability delays marriage more in egalitarian areas, although coefficients are not statistically significant.³⁴

Taken together, the pasture, Beguinage, and border-sample evidence shows that the EMP manifested alongside women’s earning opportunities in egalitarian inheritance areas. Instead, in inegalitarian inheritance areas, the EMP emerged where women lacked labor market access. Therefore, in rural areas the EMP reflected both female empowerment and financial constraint, with inheritance institutions governing which mechanism prevailed.

Fact 4. *The effects of inheritance on the EMP are stable over the early-modern period.*

So far, we have documented three facts about how inheritance institutions shaped the relationship between the EMP and economic opportunity. Our fourth stylized fact establishes that this institutional channel was a persistent structural feature between 1500 and 1750, rather than a by-product of secular trends, short-run shocks, or Malthusian cycles.

To examine whether Facts 1 and 2 vary over time, we extend the fixed-effects specification in Equation (1) as follows:

$$Y_{i,j,r,t} = \alpha + \beta \text{Egalitarian}_j + \sum_k \delta_k \left(\mathbf{1}[t = k] \times \text{Egalitarian}_j \right) + \mu_r + \mu_t + \epsilon_{i,j,r,t}, \quad (5)$$

where we interact the indicator for egalitarian inheritance in judicial district j , $\mathbf{1}[\text{Egalitarian}_j]$, with a set of indicator variables for birth decades, $\mathbf{1}[t = k]$.³⁵ The coefficients δ_k capture

³³Unlike Fact 1, we do not estimate a cross-border pair specification of Equation (2)’s form because the heterogeneous gradients underlying Fact 3 cannot be identified in this framework. By construction, each pair contains one egalitarian and one inegalitarian district, so interacting pair fixed effects with inheritance-regime indicators, as required by the fully interacted specification, would absorb the variation needed to estimate separate pasture-suitability gradients in egalitarian and inegalitarian areas.

³⁴We do not report results using the Beguinage proxy because coverage is limited to the Low Countries and northern France, substantially reducing the border-sample size.

³⁵We group all birth decades between 1500 and 1599 because coverage is sparse for these early cohorts and

Table 6: Beguinages and the EMP, fixed-effects estimates by inheritance regime.

	(1)	(2)	(3)	(4)
	<i>Dep. variable: celibacy rate</i>			
	All	Rare names	H-sample	Off main line
<i>A. Inegalitarian inheritance</i>				
Proximity to Beguinage	−0.015*** (0.003)	−0.010*** (0.003)	−0.041*** (0.006)	−0.033*** (0.006)
<i>B. Egalitarian inheritance</i>				
Proximity to Beguinage	0.012*** (0.004)	0.003 (0.005)	0.016** (0.007)	0.025*** (0.008)
<i>p</i> -value inegal. = egal.	0.000***	0.022**	0.000***	0.000***
Decade FE	Y	Y	Y	Y
Birth region FE	Y	Y	Y	Y
Mean dep. variable	0.11	0.08	0.22	0.22
N	18,239	10,431	8,558	7,499

Notes: The sample is women born in 1500–1750 in rural custom regions within 25 km of a Beguinage, who died after 40, and whose Geni record can be geo-located. Proximity is $-1 \times \log$ kilometers to the nearest Beguinage. Quality filters in columns (2)–(4) are defined in Section 3.2. Rural custom regions are > 1 km from the centroid of an urban custom settlement. Birth region fixed effects comprise *Généralité* for France, and provinces, independent counties, and duchies for Belgium (see Appendix Figure C2). Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

differential effects by cohort relative to the omitted decade (1740–50), while $\beta + \delta_k$ gives the total effect of inheritance on marriage outcomes for decade k .

Similarly, to examine time variation in Fact 3 we estimate:

$$Y_{i,j,r,t} = \alpha + \beta WEO_j + \sum_k \delta_k (\mathbf{1}[t = k] \times WEO_j) + \mu_r + \mu_t + \epsilon_{i,j,r,t}, \quad (6)$$

where we interact women’s labor-market opportunities, WEO_j , measured by the pasture suitability index, with a set of indicator variables for birth decades, $\mathbf{1}[t = k]$. We estimate this specification separately for two subsamples: women born in 1500–1750 in egalitarian inheritance areas and women born in inegalitarian inheritance areas.

Figure 6 reports cohort-specific estimates from Equations (5) and (6) estimated on our baseline sample of approximately 70,000 women born between 1500 and 1750 in France and Belgium. Panel (a) shows the effects of egalitarian inheritance on celibacy in rural areas (Fact 1), panel (b) the corresponding effects in urban areas (Fact 2), and panel (c) the effects of women’s labor-market opportunities on celibacy across inheritance regimes (Fact 3). Points plot the total effect for each birth decade k , that is, $\beta + \delta_k$, while shaded areas display 95 percent confidence intervals. For comparison, the horizontal line reports the baseline estimate obtained when all cohorts are pooled.

The figure shows that the three stylized facts are remarkably stable over the early modern period. In the sixteenth century and in essentially all decades between 1600 and 1750, egalitarian inheritance reduced celibacy in rural areas (Fact 1) and increased it in urban areas (Fact 2).

does not allow us to distinguish finer time effects.

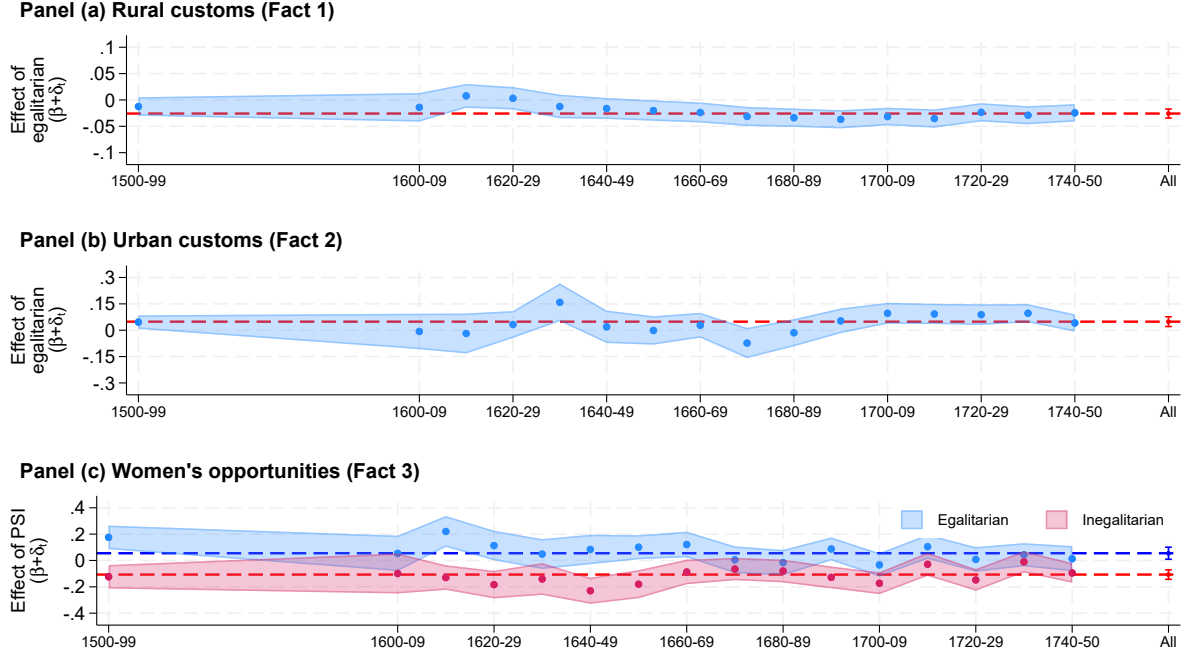


Figure 6: Effects of egalitarian inheritance and women's labor-market opportunities on celibacy, by birth cohort

Notes: This figure displays estimates from Equations (5) and (6). The dependent variable is celibacy. The sample is women born in 1500–1750 in Belgium and France, whose Geni record can be geo-located, and who died after 40. Panels (a) and (c) consider 70,728 women in rural custom regions—70,717 with data on pasture suitability; Panel (b) 4,844 women born in towns with an urban custom (see Tables 2 and 4 for details). Points represent estimates for $\beta + \delta_k$, the decade-specific effect of egalitarian inheritance (Panels (a) and (b)) and of pasture suitability (Panel (c)) on celibacy. Shaded areas are 95% confidence intervals. Horizontal dashed lines report baseline estimate from pooling all cohorts. All birth decades between 1500 and 1599 are grouped.

Women's earning opportunities strengthened the EMP in egalitarian areas and weakened it in inegalitarian areas (Fact 3). Across panels, the cohort-specific estimates are stable and not significantly different from the baseline estimates that pool all cohorts. These time-invariant effects are robust to applying our three quality filters for crowdsourced genealogies (see Appendix Figures A1 to A3) and are also visible for age at first marriage (see Appendix Figure A4). The largest deviations from the pooled effects occur for cohorts born in the 1610s and 1620s, who reached adulthood during the General Crisis of the mid-seventeenth century (Hobsbawm 1954).³⁶ Except for these cohorts, however, the coefficients remain close to the pooled estimates, suggesting that secular Malthusian cycles, crop failures, or wars generally did not alter the relationship between inheritance institutions and the EMP.

Taken together, the evidence suggests that inheritance institutions were a persistent structural determinant of the EMP between 1500 and 1750. Over the early modern period, they governed where the EMP manifested alongside economic opportunity and where it emerged in

³⁶In Western Europe, the mid-seventeenth century saw a peak in popular revolts, state breakdown, population decline, and economic crisis, possibly exacerbated by climate change (Parker 2008). In France, the General Crisis was less severe but marked by agricultural productivity decline (De Vries 2009, p. 171) and a series of civil wars—*La Fronde*.

response to economic distress.

4.1 Robustness of the stylized facts

We conduct several robustness checks of the stylized facts. This section briefly summarizes them. Detailed results are reported in Appendix A.

Estimates for men. The stylized facts are based on nearly 75,000 women born in France and Belgium between 1500 and 1750. Because marriage markets are two-sided, similar patterns should also appear among men: although margins such as age at marriage may differ across genders, male celibacy must closely mirror female celibacy because each marriage pairs one man with one woman. Using a sample of 91,010 men born in rural France and Belgium between 1500 and 1750 and 6,584 men in urban areas, we reproduce all four facts: egalitarian inheritance reduces male celibacy in rural areas with magnitudes closely matching the 20-percent gap estimated for women (Fact 1; Appendix Table A5); in urban areas it has the opposite effect (Fact 2; Appendix Table A6); in rural areas women’s earning opportunities increase male celibacy in egalitarian areas and decrease it in inegalitarian areas (Fact 3; Appendix Table A7); and these patterns remain stable from 1500 to 1750 (Fact 4; Appendix Figure A5). Men’s results are also robust across quality filters for crowdsourced genealogies. Taken together, the close correspondence between estimates for women and men indicates that the stylized facts reflect equilibrium outcomes in the marriage market rather than gender-specific biases, such as the under-representation of women in crowdsourced genealogies.

Specifications with flexible trends. We argue that causality concerns are partly mitigated by the historical evidence and the balance table discussed in Section 2.2, the inclusion of two-way fixed effects for regions and birth decades, and our cross-border specifications—which account for unobserved characteristics that vary smoothly across space. Nevertheless, estimates could still reflect unobserved *time-varying* local factors—for example if economic conditions, religiosity, or political institutions *evolved* differently across areas with different inheritance systems.

To address this possibility, we augment Equations (1) (Facts 1–2) and (4) (Fact 3) with region-by-birth-decade fixed effects. These flexibly absorb time-varying unobservable factors that differ across regions, allowing celibacy to follow distinct trends depending on local economic, religious, or political conditions. All stylized facts remain robust under this more demanding specification: in the full sample and across quality filters, estimates for celibacy and age at marriage remain close to the baseline and statistically significant (see Appendix Tables A8–A10). This strongly suggests that the stylized facts reflect local differences in inheritance rather than time-varying unobserved factors.

Spatial correlation. To account for spatial dependence in the data, we report estimates from Equation (1) and Equation (4) with Conley (1999) standard errors (see Appendix Figure A6). We use varying distance cutoffs from 0 to 200 kilometers, in 40-kilometer increments. That is, we allow observations up to 200 kilometers apart to be spatially correlated. Spatially-adjusted errors are slightly wider than our baseline errors, but all effects remain precisely estimated:

We find statistically significant differences in how inheritance affects celibacy in rural (Fact 1) and urban areas (Fact 2), and in the effect of women’s earning opportunities across egalitarian and inegalitarian areas (Fact 3). This is consistent with [Conley and Kelly \(2025\)](#), who show that applications using longitudinal data with time and region fixed effects—like ours—are less sensitive to spatial autocorrelation because these fixed effects absorb spatially correlated unobserved heterogeneity.

Beyond spatial autocorrelation in the errors, inference issues may also arise because of spatial trends ([Conley and Kelly 2025](#)). To account for this, we include standard spatial trend controls in Equations (1) and (4)—namely, linear and quadratic polynomials in longitude and latitude. Results remain robust (see Appendix Figure A7).

Clustered standard errors. We assess the sensitivity of our results to alternative clustering of the standard errors. Appendix Figure A8 reports cluster-robust standard errors using four geographic levels at which treatment assignment (i.e., inheritance) varies: birthplaces, judicial district territories and exclaves, judicial districts, and custom-law names. Across these more conservative clustering, our stylized facts remain unchanged: egalitarian inheritance has significantly different effects in rural (Fact 1) versus urban areas (Fact 2), while the effect of women’s earning opportunities differs significantly across inheritance areas (Fact 3). These clustering schemes also do not alter inference across our three quality filters for crowdsourced genealogies.

Permutation tests. We implement permutation tests by randomly reshuffling inheritance systems across judicial districts and across towns with urban customs, and re-estimating Equations (1) and (4) 1,000 times (see Appendix Figures A9 to A11). These reshuffled regressions generate a null distribution of estimates centered around zero in both rural (Fact 1) and urban areas (Fact 2). Our baseline estimates lie outside this null distribution in the baseline sample, and are larger than 92–100 percent of the permuted estimates across the quality filters. Similarly, for Fact 3, while the true data reveal opposite effects of women’s earning opportunities across inheritance systems, the reshuffled estimates are indistinguishable. These permutation tests therefore suggest that the stylized facts are unlikely to arise by chance and that inference is robust to small sample sizes and distributional assumptions.

Alternative quality filters. So far, we have shown that the stylized facts are robust to applying quality filters that address survival bias, patrilineal bias, and false-positive links—three biases specific to crowdsourced genealogies. Another potential source of bias is heaping. Heaping is common in both historical and modern data, including demographic data from censuses or the family reconstruction method.³⁷ In crowdsourced genealogies, amateur genealogists may round the birth years of their ancestors when the exact date is uncertain. Heaping therefore proxies (lack of) data quality. Indeed, the distribution of observations by birth year shows that years ending in 0 or 5 are overrepresented, particularly in the earlier part of our sample when reconstructed genealogies are less precise (see Appendix Figure A12).

³⁷Heaping is common when data are self-reported (income, age, height), imprecisely measured (birth weight, pollution), or when continuous variables are categorized (grades) ([Barreca, Lindo, and Waddell 2016](#)).

To address this bias, we augment Equations (1) (Facts 1–2) and (4) (Fact 3) with a heaping index by judicial district and decade, as well as an indicator for birth years ending in 0 or 5.³⁸ Facts 1–4 remain unchanged under these heaping-robust strategies, as well as when we combine them with our three quality filters for crowdsourced genealogies (see Appendix Tables A11 to A13 and Appendix Figure A14).

Logistic regressions. Our baseline estimates for the relationship between celibacy and inheritance rely on linear probability models with fixed effects for decades and regions. Because celibacy is a binary variable, we also consider non-linear logit specifications and show that Facts 1–3 remain robust (see Appendix Tables A14–A16).³⁹

Rural-urban definition. Our analysis distinguishes between rural and urban areas. We define rural custom regions (Facts 1 and 3) and towns with an urban custom (Fact 2) based on whether the birth location listed in a Geni profile lies within one kilometer of the centroid of a settlement with an urban custom. The stylized facts remain robust across quality filters when we use alternative cutoffs of 2, 3, 4, and 5 kilometers (see Appendix Tables A17 to A19).⁴⁰

5 Theory

The stylized facts documented in Section 4 reveal a striking pattern: the relationship between economic opportunities and the European Marriage Pattern depends systematically on inheritance institutions. Where inheritance was inequalitarian, the EMP was associated with economic distress, whereas under egalitarian inheritance it manifested alongside economic opportunity. These patterns suggest that inheritance institutions shaped marriage decisions through two distinct mechanisms: financial constraints and female empowerment.

To decompose the relative importance of these two mechanisms, we develop a structural model of marriage decisions in which inheritance rules affect both the economic resources available for household formation and women’s outside options. We then use the empirical facts documented above to estimate the shares of constrained and empowered celibacy across regions of France and Belgium.

5.1 Set up

We consider an economy populated by heterogeneous young adults characterized by a triplet: gender $i \in \{m, f\}$, income w_i , and an indicator for whether the individual has the right to inherit

³⁸Our index is based on Whipple’s index for age heaping. For each judicial district and decade we calculate $H = \frac{1}{\rho} \left(\frac{N_0 + N_5}{\sum_{i=0}^9 N_i} \right)$, where N_i is the number of observations with birth year ending in i and ρ is the share of years ending in 0 or 5 in a decade (0.2). An H between 0 and 1 indicates no bias, whereas values between 1 and 5 indicate heaping (see Appendix Figure A13 for the corresponding distribution).

³⁹We use unconditional fixed-effects logit models. Unfortunately, conditional fixed-effects logit models are not computationally feasible for Facts 1 and 3 given the large panel size, so we only report them for Fact 2. That said, the incidental parameters bias in unconditional logit models is small when there are more than 20 observations (women) per panel group (region) (Katz 2001). In the rural sample (Facts 1 and 3), the average region has 1,571 women, and all but one region has more than 30 women.

⁴⁰Fact 2 loses precision when using a 5-kilometer cutoff, but results remain qualitatively similar and statistically significant at conventional levels.

non-movable property, $a_i \in \{0, 1\}$. Marriage is a two-stage game. In the first stage, agents are randomly matched with an individual of the opposite sex from their local marriage market.⁴¹ They then decide whether to marry or remain celibate. A match results in marriage only by mutual consent, that is, if both matched individuals choose to marry. For parsimony, we focus only on the extensive margin of the marriage decision (whether to marry or remain celibate). In the second stage, couples share resources under a collective decision model (Chiappori 1988). Both couples and celibate individuals choose how much to consume and how much to invest in an independent household, which is a public good within couples.

The utility of an individual of gender i is

$$u(c_i, Q) = \ln c_i + \ln(Q + \nu^h) - s_i, \quad (7)$$

where c_i denotes private consumption and Q is an independent household good. It captures investments in forming and maintaining a residential unit separate from one's parents or extended family—the household arrangement most characteristic of the EMP (Hajnal 1965). In practice, Q includes expenditures such as housing construction or rent, furniture, firewood, soap, clothing, and (potentially) childrearing. For couples, Q is a public good. When $Q = 0$, individuals co-reside with parents or kin in an extended household; when $Q > 0$, they live in an independent household.⁴² The preference parameter $\nu^h > 0$ captures the utility value of co-residence and ensures that utility is well defined at $Q = 0$. We allow ν^h to vary with the inheritance regime, h , in the estimation. Consistent with the sociological literature linking inequalitarian inheritance to extended households and egalitarian inheritance to nuclear households (Le Play 1875; Todd 1990),⁴³ we expect $\nu^{\text{inegalitarian}} > \nu^{\text{egalitarian}}$. The only difference in preferences across men and women is s_i , which captures the disutility from being single. We assume $s_f > 0$ and $s_m = 0$, reflecting a social norm that stigmatizes single women.

To model couples' decision making, we assume a collective decision model. Spouses negotiate on consumption (c_f, c_m) and how much to invest in forming and maintaining an independent household (the public good Q). The couple's objective function is:

$$U(c_f, c_m, Q) = \theta u(c_f, Q) + (1 - \theta)u(c_m, Q), \quad (8)$$

where θ is the wife's bargaining power.

In the last stage of the game, after marriage decisions have been made, each couple or celibate individual maximizes their expected utility. In doing so, they face two constraints. The

⁴¹To simplify notation, we abstract from local marriage market indices. That said, incomes, w_i , and inheritance rules, a_i , vary across markets. For estimation, we treat each judicial district (and each exclave) as a separate local marriage market. This choice is consistent with observed matching patterns, as 81 percent of couples were from the same judicial district or exclave (see Section 6.1 for details).

⁴²Historical evidence suggests that married and celibate individuals often lived away from parents or kin, either in neolocal households (couples) or as servants, lodgers, or in solitary households (celibates) (Hajnal 1982; Kusmaul 1981). Households headed by single women ranged from 15 to 22 percent in rural Bruges, Grenoble, and Bridgnorth around our study period. In these areas, female household heads often owned real estate; and celibate and married households owned comparable furniture and material goods (De Langhe 2012, Table 7 and p. 206; Schmidt, Devos, and Blondé 2015, p. 5 and pp. 17–18), consistent with $Q > 0$ being feasible for both couples and (high-income) celibates.

⁴³For example, in Todd (1990)'s classification of family types, France is used as an example of extended families with inequalitarian inheritance (*stem*) and of nuclear families with egalitarian inheritance (*egalitarian nuclear*).

first is a budget constraint. We assume that each adult is endowed with an income $w_i \geq 0$, derived either from labor market wages or subsistence farming. Women's income is determined by local labor market conditions—with animal husbandry constituting the main source of rural female employment (Kusmaul 1981; Voigtlander and Voth 2009). Every man has a different income w_m drawn from a lognormal distribution with mean μ_ω and variance σ_ω^2 of log-income.⁴⁴ We do not impose assumptions on the gender income gap, but expect male income to be higher on average in the estimation. In addition, each independent household pays a maintenance cost ρ for each unit of the household good. Because this cost is shared within couples, it gives economic incentives to marry (Greenwood et al. 2016). Given these assumptions, the budget constraint for celibate individuals is:

$$b(c_i, Q) = c_i + \rho Q - w_i \leq 0, \quad (9)$$

and the budget constraint of couples is:

$$b(c_f, c_m, Q) = c_f + c_m + \rho Q - w_f - w_m \leq 0. \quad (10)$$

The second constraint is that establishing an independent household, $Q > 0$, entails a substantial fixed cost—for example, acquiring land, building or renting a dwelling away from one's parents, and furnishing it. Access to inheritance plays a key role in relaxing this constraint. Individuals with inheritance rights receive land as a bequest and can use family assets to cover the fixed cost of forming an independent household. In contrast, non-heirs face tighter constraints and are therefore more likely to co-reside with parents or kin in an extended unit as an alternative. To capture this parsimoniously, we assume that access to inheritance is a necessary condition for forming an independent household. Let $\mathcal{Q}(\cdot)$ denote the feasible set for Q . For celibate individuals, the feasible set is given by:

$$\mathcal{Q}(a_i) = \begin{cases} 0, & \text{if } a_i = 0, \\ \mathbb{R}_{\geq 0}, & \text{if } a_i = 1, \end{cases} \quad (11)$$

so that $Q \in \mathcal{Q}(a_i)$. This implies that independent household formation is feasible only for individuals with inheritance rights. For couples, an independent household can be established as long as at least one spouse is entitled to inherit ($a_f + a_m > 0$), so the corresponding feasible set is given by:

$$\mathcal{Q}(a_f, a_m) = \begin{cases} 0, & \text{if } a_f + a_m = 0, \\ \mathbb{R}_{\geq 0}, & \text{if } a_f + a_m > 0. \end{cases} \quad (12)$$

so that $Q \in \mathcal{Q}(a_f, a_m)$.

This simplifying assumption reflects the formidable transaction costs of property in pre-modern Europe and the limited development of land and credit markets (e.g., Finley, Franck, and Johnson 2021). As a result, land was primarily acquired through bequests, making inheritance central to independent household formation. It also implies that heirs are valuable in the

⁴⁴A lognormal distribution guarantees that male incomes only take positive values $w_m > 0$.

marriage market, as marrying an heir provides access to independent household formation for individuals excluded from inheritance.

Next, we solve the game by backward induction, starting from the final stage: the choice of consumption and investment in the independent household good, conditional on marital status.

5.2 Consumption and household decisions

Conditional on marital status, individuals choose private consumption and investment in the household good to maximize utility (Equations (7) and (8) for celibate individuals and couples), subject to the budget constraint (Equations (9) and (10)) and the inheritance constraint (Equations (11) and (12)). Together, these constraints imply that an independent household is established only when individuals (or couples) have access to inheritance and their income can cover the maintenance cost of the household good. Otherwise, they co-reside with parents or kin in an extended household and consume their entire income. Below we describe the optimal allocations; full expressions are reported in Appendix B.1.

Celibate individuals. For celibate individuals, the optimal allocation depends on both inheritance status and income. If they cannot inherit ($a_i = 0$), the feasibility constraint implies $Q = 0$, so that they consume their entire income, $c_i = w_i$.

If individuals have the right to inherit ($a_i = 1$), they can invest in the household good, but doing so requires sufficient income to cover its maintenance cost ρ . In particular, there exists a threshold $\nu^h \rho$ such that individuals invest in Q only when $w_i > \nu^h \rho$. Above this threshold, the optimal allocation is:

$$Q = \frac{1}{2\rho}(w_i - \nu^h \rho), \quad c_i = \frac{1}{2}(w_i + \nu^h \rho).$$

Below the threshold, the solution is again $Q = 0$ and $c_i = w_i$.

Couples. For couples, decisions depend on both inheritance and pooled income. If neither spouse has inheritance rights ($a_f + a_m = 0$), the feasibility constraint implies $Q = 0$, and total income is allocated across spouses according to bargaining weights:

$$c_f = \theta(w_f + w_m), \quad c_m = (1 - \theta)(w_f + w_m).$$

If at least one spouse has inheritance rights, investment in the household good is feasible but it requires that the couple's pooled income is sufficiently high. In particular, couples invest in Q only when $w_f + w_m > \nu^h \rho$. In that case, the optimal allocation is:

$$Q = \frac{w_f + w_m - \nu^h \rho}{2\rho}, \quad c_f = \frac{\theta}{2}(w_f + w_m + \nu^h \rho), \quad c_m = \frac{1 - \theta}{2}(w_f + w_m + \nu^h \rho).$$

Otherwise, the solution coincides with the case without inheritance.

5.3 Marriage decisions

In the first stage of the game, individuals decide whether to marry or remain celibate. They are randomly matched with a potential partner of the opposite sex from their local marriage market.

$p(a_f, a_m)$ denotes the probability of a match between a woman and a man with inheritance rights a_f and a_m , which depends on the local inheritance rule.

After being randomly matched, women and men evaluate the value of marrying. We denote by $\mathcal{M}_f(a_f, w_f, a_m, w_m)$ the value to a woman with income w_f and inheritance rights a_f of marrying a man with income w_m and inheritance rights a_m :

$$\mathcal{M}_f(a_f, w_f, a_m, w_m) = u(c_f^*, Q^*) ,$$

where (c_f^*, c_m^*, Q^*) maximize the couple's objective function $U(c_f, c_m, Q)$, subject to their budget constraint $b(c_f, c_m, Q) \leq 0$ and the feasibility constraint requiring inheritance for independent household formation, $Q \in \mathcal{Q}(a_f, a_m)$. Symmetrically, to a man with income w_m and inheritance rights a_m , the value of marrying a woman with income w_f and inheritance rights a_f is:

$$\mathcal{M}_m(a_f, w_f, a_m, w_m) = u(c_m^*, Q^*) .$$

To decide whether to marry or remain celibate, individuals compare the value of marriage to the value of remaining single:

$$\mathcal{S}_i(a_i, w_i) = u(c_i^*, Q^*) ,$$

where (c_i^*, Q^*) maximize a celibate individual's utility $u(c_i, Q)$, subject to the budget constraint $b(c_i, Q) \leq 0$ and the feasibility constraint $Q \in \mathcal{Q}(a_i)$, for $i \in \{f, m\}$. See Appendix B.2 for closed-form expressions for all these value functions.

Marriage occurs only by mutual consent, that is, if both randomly matched individuals choose to marry. Mutual consent was a central feature of marriage under the EMP (De Moor and Van Zanden 2010). It has been common practice since the 1140s, when the *Decretum Gratiani* established mutual consent as official doctrine of the Catholic Church. Formally, a match results in marriage if and only if:

$$\mathcal{M}_f(a_f, w_f, a_m, w_m) \geq \mathcal{S}_f(a_f, w_f) \quad \text{and} \quad \mathcal{M}_m(a_f, w_f, a_m, w_m) \geq \mathcal{S}_m(a_m, w_m) . \quad (13)$$

The assumptions of the model imply several advantages to marriage relative to celibacy. Marriage allows the cost of maintaining the household, ρ , to be shared. It can provide access to inheritance for spouses who would otherwise be excluded, thereby enabling the formation of an independent household. For women, marriage also removes the potential social stigma associated with celibacy. Conversely, the advantage of remaining celibate is that it avoids pooling and sharing resources within marriage, which is particularly relevant for individuals with high incomes and/or low bargaining power θ . Taken together, these incentives give rise to two types of celibacy for women:⁴⁵

Constrained celibacy. The first type of celibacy arises from constraints rather than choice. In this case, the benefits of marriage may exceed those of remaining celibate, but a woman nevertheless remains celibate because her potential partner rejects the match. Formally, we

⁴⁵The same arguments apply for men; we focus on women to match our empirical exercise.

define constrained celibacy as:

$$\mathcal{S}_m(a_m, w_m) > \mathcal{M}_m(a_f, w_f, a_m, w_m) .$$

Empowered celibacy. The second type of celibacy reflects women’s choices. Women receive a marriage proposal but reject it because the benefits of remaining celibate exceed those of marriage. Formally:

$$\mathcal{S}_f(a_f, w_f) > \mathcal{M}_f(a_f, w_f, a_m, w_m) \quad \text{and} \quad \mathcal{M}_m(a_f, w_f, a_m, w_m) \geq \mathcal{S}_m(a_m, w_m) .$$

Inheritance crucially shapes the incentives to marry or remain celibate, as well as the type of celibacy observed. On the one hand, access to inheritance increases women’s incentives to remain celibate, as it allows them to form an independent household without relying on a partner’s inheritance. This force is particularly relevant for high-income women, as for them the loss of income resulting from the household bargaining process is more likely to outweigh the benefits of sharing the household good’s cost and the social stigma associated with female celibacy. The model therefore predicts that egalitarian inheritance rights can generate a positive relationship between women’s income and celibacy (Fact 3), and that celibacy in such areas primarily reflects women’s choices—an empowerment channel.

On the other hand, inheritance rights can reduce female celibacy. When access to inheritance is broad and includes more men and women, more potential couples can form an independent household, increasing the incentives to marry and share the maintenance costs of an independent household. This force is particularly relevant in low-income environments, where pooling resources is necessary to cover the maintenance cost of the household good. By contrast, when inheritance is restricted to a small subset of individuals (e.g., first-born men), this incentive disappears for many potential couples. As a result, low-income women are more likely to be rejected as their potential partner might prefer consuming all his income to pooling resources. The model therefore predicts that in inequalitarian inheritance regimes, celibacy rates are higher (Fact 1), celibacy is more prevalent among low-income women (Fact 3), and celibacy primarily reflects a financial constraints channel.⁴⁶

Overall, the relationship between inheritance and marriage in the model is consistent with a large sociological literature arguing that “there exists an iron chain” between inheritance and marriage (Lanzinger 2003b, pp. 130-131). At the same time, the model allows this link to differ across income levels and inheritance regimes—sometimes ambiguously. For example, in inequalitarian areas with impartible inheritance that includes women (e.g., Navarre), the effects described above are moderated by an additional force: heiresses are more attractive in the marriage market because marrying them may provide access to the independent household

⁴⁶There are four possible matches with respect to inheritance rights. First, when matched individuals lack inheritance rights ($a_f = a_m = 0$), forming an independent household is not feasible for either couples or celibates. Marriage occurs if the woman prefers sharing her income to facing the stigma of celibacy, and her income is high enough for the man to prefer pooling resources. Second, when an heiress is matched with a non-heir ($a_f = 1, a_m = 0$), the woman can form an independent household on her own if her income is sufficiently high, while the man cannot unless he marries and the couple’s pooled income is sufficient. Third, the symmetric case arises when an heir is matched with a non-heiress ($a_f = 0, a_m = 1$). Fourth, when both individuals have inheritance rights ($a_f = a_m = 1$), they can form an independent household when celibate, but marriage allows to share its maintenance cost. See Appendix B.3 for details.

good. In such settings, the model can also predict that celibacy outcomes reflect women’s empowerment.

We now turn to the data to discipline the quantitative importance of the constrained and empowered celibacy mechanisms. Specifically, we estimate the model’s structural parameters using the stylized facts and then use these estimates to quantify the shares of constrained and empowered celibacy across regions of France and Belgium.

6 Structural estimation

We identify the deep parameters of the model using Facts 1 and 3 described in Section 4. Some information is fixed a priori using empirical data: parameter ρ representing the maintenance cost of the independent household good, women’s incomes, and the random matching probabilities. The remaining six parameters are estimated using a minimum distance procedure.

6.1 A priori information

Maintenance cost of the household good. The parameter ρ is fixed using evidence on household expenditures in early-modern Europe. Such expenditures are notoriously difficult to reconstruct. While a few wealthy household account books survive, they are typically not representative of an average household’s expenditures (Horrell 2023, p. 1033). We rely on Horrell (2023), who reconstructs annual expenditures for a representative working household in England in 1700, 1750, and 1790.⁴⁷ Using household accounts, workhouse dietaries, probate inventories, and other archival sources, she estimates spending across a broad set of categories.⁴⁸ Following Horrell (2023)’s classification, we treat expenditures on candles, soap, firewood, rent, clothing, and furniture as investments in the household good Q . We compute their share in total household expenditure, which also includes consumption goods such as food, beverages, and tobacco.

The resulting shares are 0.29, 0.33, and 0.29 for 1700, 1750, and 1790, respectively (see Appendix Table C4). Based on these estimates, we set the maintenance cost of the household good to $\rho = 0.3$.⁴⁹

Random matching probabilities. The matching probabilities are determined by the composition of individuals in each local marriage market. We treat each judicial district (and each exclave) as a separate market, as inheritance rules vary across districts and therefore shape the distribution of heirs and non-heirs. This geographical definition of marriage markets is also supported by the data: in our analysis sample, approximately 81 percent of matched couples—29,500 out of 36,605—consist of a husband and wife born in the same judicial district or exclave.

⁴⁷England offers a relatively comparable setting to France and Belgium in terms of family types and EMP characteristics (see, e.g., De Moor and Van Zanden (2010)).

⁴⁸In detail, Horrell (2023) reconstructs food expenditures in 1700 and 1750 from household accounts, workhouse and charity dietaries; soap, candles and fuel from Allen (2001), Clark (2007), and Muldrew (2011); beds, cutlery, clocks, mirrors and other furniture from probate inventories; and clothing from workhouse and churchwardens’ records, as well as items reported in theft cases at the Old Bailey. For 1790, she uses mainly 283 household budgets with expenditures, as analyzed by Horrell (1996).

⁴⁹Normalizing the maintenance cost to a share ensures consistency with the scale of female incomes, which are bounded between 0 and 1 in the estimation.

Table 7: Random matching probabilities by inheritance regime.

		$p(1, 1)$	$p(1, 0)$	$p(0, 1)$	$p(0, 0)$
Egalitarian	partible + women included	1	0	0	0
Inegalitarian	partible + women excluded	0	0	1	0
Inegalitarian	impartible + women included	0.111	0.222	0.222	0.444
Inegalitarian	impartible + women excluded	0	0	0.58	0.42

Notes: Entries report $p^j(a_f, a_m)$, the probability of matching between a woman and a man with inheritance status a_f and a_m . Under impartible inheritance, shares assume a three-child family structure.

This indicates that marriage markets were predominantly local and supports our treatment of judicial districts and exclaves as separate markets.

For each market j , the probability of a match between a woman with inheritance status a_f and a man with inheritance status a_m is given by:

$$p^j(a_f, a_m) = s^j(a_f)s^j(a_m),$$

where $s^j(a_f)$ and $s^j(a_m)$ denote the shares of women and men with inheritance status a_f and a_m , respectively.

Table 7 reports the matching probabilities pinned down by the local inheritance regime. Under egalitarian inheritance, all women and men are heirs. Under partible inheritance excluding women, there are no female heirs while brothers divide the inheritance, so all men are heirs. Under impartible inheritance, one child is favored over the rest, so the share of heirs depends on the family size. We consider three-child families, consistent with data on completed fertility (excluding infant mortality) in impartible areas (Gay, Gobbi, and Goñi 2026, Figure 4). This implies that, when inheritance is impartible and women are included, one third of individuals are heirs. When women are excluded, no women inherit and the share of male heirs is 7/12.⁵⁰

Women’s income. Although we do not observe women’s labor market income directly, we proxy the parameter w_f using the local pasture suitability index. This index captures climatic and soil characteristics favorable to animal husbandry—the main source of rural female employment in pre-modern Europe (Kusmaul 1981; Voigtlander and Voth 2009). It is therefore a proxy for lower gender wage gaps in later census data (see Section 3.3) and, more generally, for women’s incomes.

Specifically, we set a woman’s income equal to the average pasture suitability index within her local marriage market, i.e., her judicial district or exclave of birth. This assumes that women within a given geographical unit face similar labor market conditions. The index, and hence women’s income, is normalized to lie between 0 and 1.

⁵⁰Under a three-child family structure, a man can be first-, second-, or third-born, each with probability 1/3. A first-born is always an heir, a second-born is an heir with probability 1/2 (i.e., if he is preceded by a girl), and a third-born with probability $(1/2)^2$ (i.e., if he is preceded by two girls). This implies a total probability of being an heir of $1/3 + (1/3)(1/2) + (1/3)(1/2)^2 = 7/12$.

6.2 Minimum distance estimation

We estimate the remaining six parameters of the model using a simulated minimum distance procedure, a variant of the simulated method of moments. These parameters are the wife’s bargaining power (θ); women’s disutility from being single (s_f); the preference parameters for extended household co-residence in egalitarian ($\nu^{\text{egalitarian}}$) and inegalitarian inheritance areas ($\nu^{\text{inegalitarian}}$); and the mean (μ_ω) and variance (σ_ω^2) of the log-normal distribution of men’s income.

We identify these parameters by minimizing the distance between six empirical and simulated moments. The moments are drawn from Facts 1 and 3 and capture the relationship between inheritance institutions, women’s economic opportunities, and celibacy in rural areas (see Section 4). Specifically, we target the intercepts and slopes from three fixed-effects regressions: female celibacy on egalitarian inheritance (column 1 of Table 2); female celibacy on the pasture suitability proxy for women’s economic opportunities in inegalitarian inheritance areas (column 1 of Table 5, Panel A) and female celibacy on the same proxy in egalitarian inheritance areas (column 1 of Table 5, Panel B). Since we estimate six parameters using six empirical moments, the model is exactly identified.

The objective function that we minimize is given by

$$f(p) = (d - s(p))'W(d - s(p)) , \quad (14)$$

where p is the vector of model parameters, d is the vector of empirical moments, and $s(p)$ is the vector of simulated moments implied by the model. W is a diagonal weighting matrix whose j -th diagonal element is given by $1/\hat{\sigma}_j^2$, where $\hat{\sigma}_j$ denotes the standard error of moment j . This weighting scheme places greater weight on moments estimated more precisely in the data while reducing the influence of noisier moments.

To compute the vector of simulated moments, we proceed as follows. We simulate 10,000 women for each of the 992 marriage markets in our sample—a judicial district or an exclave. As explained above, a woman’s income w_f is set equal to the average pasture suitability index in her marriage market. Each woman is matched with a potential husband whose income w_m is drawn from a log-normal distribution $\text{Lognormal}(\mu_\omega, \sigma_\omega)$.⁵¹ The probability of a match between a woman and a man with inheritance rights a_f and a_m is determined by the local inheritance rule in each marriage market (see Table 7). For each simulated match $\{a_f, w_f, a_m, w_m\}$, we compute the value functions of marrying and remaining celibate for both the woman and the man, and determine whether the match results in marriage. This yields a large number of simulated marriage decisions, which we use to calculate the six simulated moments. Specifically, we estimate Equation (1) using all simulated marriage decisions (Fact 1), and Equation (3) using simulated marriage decisions in egalitarian and inegalitarian areas separately (Fact 3). In addition, for matches that do not result in marriage, we observe whether the woman rejected the match (empowered celibacy) or whether she was rejected by her potential partner (constrained celibacy). We use this information to decompose celibacy in each judicial district and exclave

⁵¹Men’s income w_m therefore has mean $\exp\{\mu_\omega + \sigma_\omega/2\}$, where μ_ω and σ_ω denote the mean and variance of $\ln w_m$.

into shares of empowered and constrained celibacy.

Because the simulated objective function, $f(p)$, may feature multiple local minima, we use a multi-start optimization procedure based on [Powel \(2002\)](#)’s UOBYQA, a derivative-free algorithm designed for nonlinear optimization problems. We first perform an exploratory search over 400 randomly sampled parameter vectors spanning the parameter space.⁵² This first stage increases the likelihood of finding the global optimum in the presence of multiple local minima. We then conduct 10 additional local searches using small perturbations around the best candidate solution from the exploratory stage. This approach combines global exploration with local refinement and reduces sensitivity to initial conditions while remaining computationally feasible.⁵³

To compute standard errors, we draw 100 bootstrap samples with replacement from the original data. For each bootstrap sample, we recompute the six empirical moments and re-estimate the model to match these moments using a local UOBYQA optimization initialized at the original-sample estimates. The bootstrap standard errors are given by the standard deviations of the estimated parameters across the 100 bootstrap replications.

6.3 Results

Table 8 presents the estimates for the model parameters. We estimate the wife’s bargaining power at $\theta = 0.169$, indicating that women had limited control over the allocation of household resources within marriage. In the model, this reduces the attractiveness of marriage for women with relatively high outside options, as a substantial share of pooled resources accrues to the husband. Historically, the estimate aligns with evidence of male authority and the patriarchal organization of households in pre-modern Europe. Relatedly, our estimate for $s_f = 1.681$ suggest that social norms stigmatized single women. This implies that a celibate woman would require approximately 5.4 times higher consumption to compensate for the social stigma associated with remaining unmarried.⁵⁴

The preference parameters $\nu^{egalitarian}$ and $\nu^{inegalitarian}$ capture the utility value of co-residence in extended households, which guarantees the possibility of living without the independent household good (i.e., $Q = 0$). In egalitarian areas, where inheritance rules facilitated the formation of independent households away from one’s parents or kin (i.e., $Q > 0$), we estimate $\nu^{egalitarian} \approx 0$, implying essentially no utility value from co-residence in extended households. By contrast, in inegalitarian areas—where fewer individuals had access to inheritance and independent household formation was therefore more costly—we estimate a positive utility value of living in an extended household of $\nu^{inegalitarian} = 1.416$. This is consistent with the sociological literature linking inegalitarian inheritance to extended households and egalitarian inheritance to nuclear households ([Le Play 1875](#); [Todd 1990](#)). Quantitatively, the estimate

⁵²These initial values are sampled using uniform and log-uniform distributions to ensure coverage of economically plausible regions of the parameter space. Specifically, we draw $\mu_\omega \in [-1, 1]$, $\theta \in (0, 0.4]$, and $s_f \in [-4, 0]$ from uniform distributions, and $\sigma_\omega^2 \in [0.05, 4]$, $\nu^{inegalitarian} \in (10^{-6}, 1.5]$, and $\nu^{egalitarian} \in (10^{-6}, 1]$ from log-uniform distributions.

⁵³We implemented the algorithms in Fortran 90 and compiled the code using the GNU Fortran (gfortran) compiler distributed through WinLibs.

⁵⁴Because utility is logarithmic in consumption, the consumption-equivalent compensation associated with the stigma parameter is given by $e^{s_f} \approx 5.4$.

Table 8: Identified parameters.

Parameter		Value	SE
Wife’s bargaining power	θ	0.169	0.016
Stigma for single women	s_f	1.681	0.111
Preference parameter for co-residence	$\nu^{egalitarian}$	0.000	0.000
Preference parameter for co-residence	$\nu^{inegalitarian}$	1.416	0.078
Location parameter male income	μ_ω	−0.995	0.004
Scale parameter male income	σ_ω	2.287	0.162

Note: $f(p) = 3.482$; Standard errors calculated from estimates in 100 bootstrapped samples.

implies that co-residence in an extended household provides considerably less utility than independent household formation. For example, the utility from co-residence alone is roughly 40 percent of the utility associated with one unit of the independent household good.⁵⁵

To interpret the parameters governing men’s income, μ_ω and σ_ω , recall that men’s income is drawn from a log-normal distribution, while women’s income is proxied by the pasture suitability index normalized between 0 and 1. The estimated parameters imply an average male income of $\exp\{\mu_m + \sigma_m/2\} = 1.16$, above both the mean (0.73) and upper bound (1.00) of women’s income. This corresponds to an average female-to-male income ratio of approximately 0.63. Importantly, this ratio was not targeted in the estimation, yet closely matches the female-to-male wage ratio of 0.64 reported in the Belgian agricultural census of 1830 (see Appendix D), as well as the wage ratios documented for seven Flemish farms in the 1750s–90s by Helsen (2023, Table 2), which cluster around 0.6–0.7. This provides reassuring external validation for the model’s estimated income structure. The fact that the model closely matches out-of-sample historical gender wage ratios, despite not targeting them in the estimation, adds credibility to the estimated income structure.

Table 8 also reports bootstrap standard errors for each parameter. Overall, the estimates are precise, with standard errors remaining small relative to the corresponding point estimates. This suggests that the model is well identified and that small perturbations in the empirical moments lead to similar estimated parameters.

Overall, the structural model fits the data well. Table 9 compares the empirical moments with their simulated counterparts. The model reproduces both the lower rural celibacy rates observed in egalitarian inheritance areas (Fact 1) and the opposite effects of women’s economic opportunities across inheritance regimes (Fact 3). Quantitatively, the model exactly matches the intercept and slope coefficients for Fact 1 and closely reproduces those for Fact 3. In particular, the model captures the positive relationship between women’s economic opportunities and celibacy in egalitarian areas (0.036 in the model versus 0.055 in the data) and the negative relationship in inegalitarian areas (−0.090 versus −0.107), which constitute the central empirical patterns linking inheritance institutions and the European Marriage Pattern.

Figure 7 illustrates the model’s ability to reproduce Fact 3. We construct equal-sized binned

⁵⁵The utility associated with co-residence in an extended household is $\ln(\nu^{inegalitarian}) = \ln(1.416) \approx 0.35$, while the utility associated with one unit of the independent household good is $\ln(1 + \nu^{inegalitarian}) = \ln(2.416) \approx 0.88$. Hence, the former is roughly 40 percent of the latter.

Table 9: Fit of targeted moments and celibacy aggregates.

	Data	Model
<i>Fact 1: Celibacy on egalitarian inheritance, FE</i>		
Intercept	0.112	0.113
Slope coefficient	−0.026	−0.027
<i>Fact 3: Celibacy on pasture suitability, FE</i>		
Intercept, egalitarian areas	0.055	0.070
Slope coefficient, egalitarian areas	0.055	0.036
Intercept, inegalitarian areas	0.180	0.168
Slope coefficient, inegalitarian areas	−0.107	−0.090
<i>Celibacy aggregates (non-targeted)</i>		
Average celibacy rate	0.099	0.099
Average celibacy rate, egalitarian areas	0.094	0.086
Average celibacy rate, inegalitarian areas	0.104	0.114

scatterplots of female celibacy and pasture suitability separately across inheritance regimes. The left panels use simulated data from the model; the right panels use observed data. Variables are residualized using region fixed effects (data and model) and decade fixed effects (data). The figure shows that higher pasture suitability is associated with lower celibacy in inegalitarian areas and higher celibacy in egalitarian areas, both in the simulated and observed data. Although the estimation targets only the corresponding regression coefficients, the model also captures the broader linear shape of the relationship across the 992 districts in our sample, particularly in inegalitarian areas. The fit does not differ systematically across different points in the distribution of the pasture suitability proxy for women’s economic opportunities. Overall, this is a demanding feature to match and provides a powerful internal consistency check: the same model must generate opposite gradients depending on the inheritance regime.

As an additional test, we examine three moments not directly targeted in the estimation: aggregate celibacy rates in the full sample and in egalitarian and inegalitarian inheritance areas (see Table 9). The simulated aggregate celibacy rate is identical to its empirical counterpart (9.9 percent), while in the egalitarian and inegalitarian samples celibacy rates differ by less than one percentage point. The model therefore reproduces broader patterns in the data that were not used in the minimum distance estimation.

Since we estimate six parameters using six empirical moments, the model is exactly identified. Appendix Figure B1 illustrates the identification by showing how varying each parameter affects the simulated relationship between female celibacy and income across inheritance regimes; Appendix B.4 discusses these comparative statics in detail. Parameters μ_ω , θ , and s_f are primarily identified by the slopes of this relationship. Holding other parameters fixed, higher values of μ_ω , θ , or s_f make the relationship more negative. The economic intuition is that higher women’s bargaining power, θ , or a higher stigma of remaining single, s_f , reduce the attractiveness of celibacy, particularly among high-income women. This makes the female celibacy-income relationship more negative. A higher μ_ω increases men’s incomes on average. Although this makes marriage and investment in the household good more feasible, higher-income men also

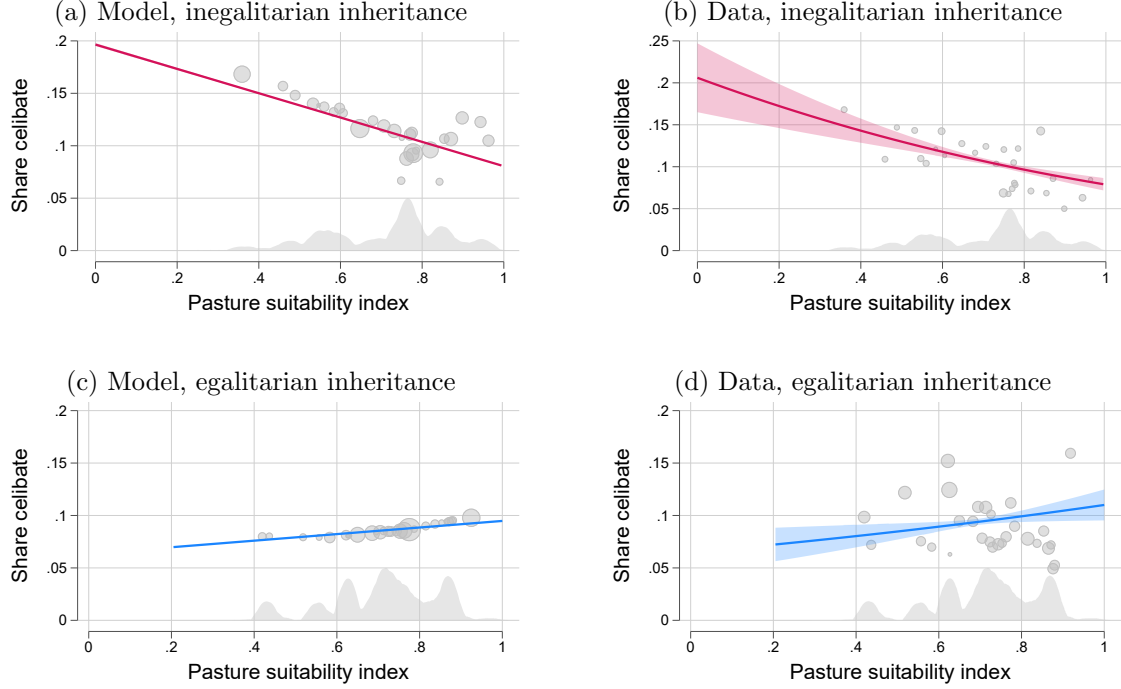


Figure 7: Fit of celibacy and women's opportunities, by judicial district (or exclave).

Notes: This figure displays equal-size binned scatter plots of rural female celibacy and pasture suitability across inheritance systems, using the SMM simulated data (left panels) and the original data (right panels). Variables are residualized by fixed effects for regions (data and model) and decades (data), then means are added back. Markers indicate average celibacy within equal-sized bins and are proportional to the number of observations in the data, lines display a linear fit, shaded areas 95% confidence intervals, and pasture suitability distributions are plotted below.

have less to gain from pooling resources with a wife. They therefore reject low-income women more often. In the estimated model, this force dominates, making the female celibacy-income relationship more negative. The variance of men's income, σ_ω , is primarily identified by the intercepts of the targeted regressions. Higher income dispersion increases the mass of both very low- and very high-income men, reducing the share of mutually beneficial matches and raising celibacy rates across the board. Finally, $\nu^{egalitarian}$ and $\nu^{inegalitarian}$ are primarily identified by differences in the celibacy-income relationship across inheritance regimes, since they are the only preference parameters allowed to vary between egalitarian and inegalitarian areas.

6.4 Decomposition of celibacy

Here we use the parameters identified in Section 6.3 to decompose the estimated celibacy rates into two types: empowered and constrained celibacy. Empowered celibacy reflects women's choices. As explained above, it arises when a woman receives a marriage proposal but rejects it because the value of remaining celibate exceeds that of marriage. Formally, $\mathcal{S}_f > \mathcal{M}_f$ and $\mathcal{M}_m \geq \mathcal{S}_m$. By contrast, constrained celibacy does not arise from women's choices but from the rejection of a potential partner. Formally, $\mathcal{S}_m > \mathcal{M}_m$.

For this decomposition, we simulate 10,000 women for each of the 992 judicial district or exclaves in our sample. Using the identified parameters from Table 8, we compute the

value functions of marrying ($\mathcal{M}_f, \mathcal{M}_m$) and remaining celibate ($\mathcal{S}_f, \mathcal{S}_m$) for each woman and her potential partner. We then classify celibate women according to whether they rejected a marriage proposal (empowered celibacy) or were rejected by their potential partner (constrained celibacy).

We estimate that 65.56 percent of celibate women in France and Belgium chose not to marry. The remaining 34.44 percent reflected constraint rather than choice. These aggregate estimates are precise, with bootstrapped standard errors of around 0.066.⁵⁶ To our knowledge, these estimates provide the first quantitative decomposition of the EMP. They therefore shed new light on a longstanding debate over whether the EMP primarily reflected female autonomy or emerged as a byproduct of poverty and economic constraints. Overall, the evidence suggests that female empowerment was quantitatively more important in explaining the EMP in pre-modern France and Belgium, with roughly seven out of ten celibate women remaining unmarried by choice rather than necessity.

The aggregate dominance of empowered celibacy nevertheless masks substantial regional heterogeneity in the nature of the EMP. Figure 8 shows the decomposition of celibacy for all 992 judicial districts and exclaves in France and Belgium. The figure reveals substantial regional differences. In some areas—such as West Flanders, Brittany, and Lorraine—our estimates imply that around 80 percent of celibate women chose not to marry. There, the EMP mostly reflected empowered celibacy. In other regions—such as Normandy, the South-East of France, and Corsica—the estimated share of constrained celibacy exceeds 50 percent, and hence economic constraints played a larger role in explaining the EMP. More generally, the figure suggests that both forms of celibacy coexisted throughout France and Belgium. However, empowered celibacy was the dominant form: in the median district, two-thirds of celibate women chose not to marry.

Correlates of empowered celibacy. Next, we explore correlates of this regional heterogeneity in the nature of the EMP. In detail, we examine the relationship between the estimated local shares of empowered celibacy and two key variables for women’s economic independence: inheritance rights and income opportunities. Figure 9 documents a strong relationship between both variables and the nature of celibacy. Panel (a) shows that areas where women inherited exhibit substantially higher shares of empowered celibacy: 0.72 versus 0.50. This difference is not limited to the mean: the entire distribution of empowered celibacy is shifted to the right in judicial districts where women had inheritance rights. Panel (b) shows that empowered celibacy also increases with women’s incomes. In both inheritance systems, areas with higher pasture suitability—our proxy for women’s labor income opportunities—display higher shares of empowered celibacy. That said, the income–empowered celibacy gradient is significantly steeper where women had the right to inherit. Together, these patterns suggest that inheritance rights were central to female empowerment within the EMP: they were associated with higher empowered celibacy directly and amplified the relationship between women’s income and empowerment.

⁵⁶To compute these averages, we aggregate the simulated number of constrained and empowered celibate women across all judicial districts and exclaves, scaling each unit by the number of observations in the Geni database. From these weighted totals, we then compute the overall share of constrained and empowered celibacy among all celibate women. Standard errors are obtained from decomposing celibacy using parameters estimated from 100

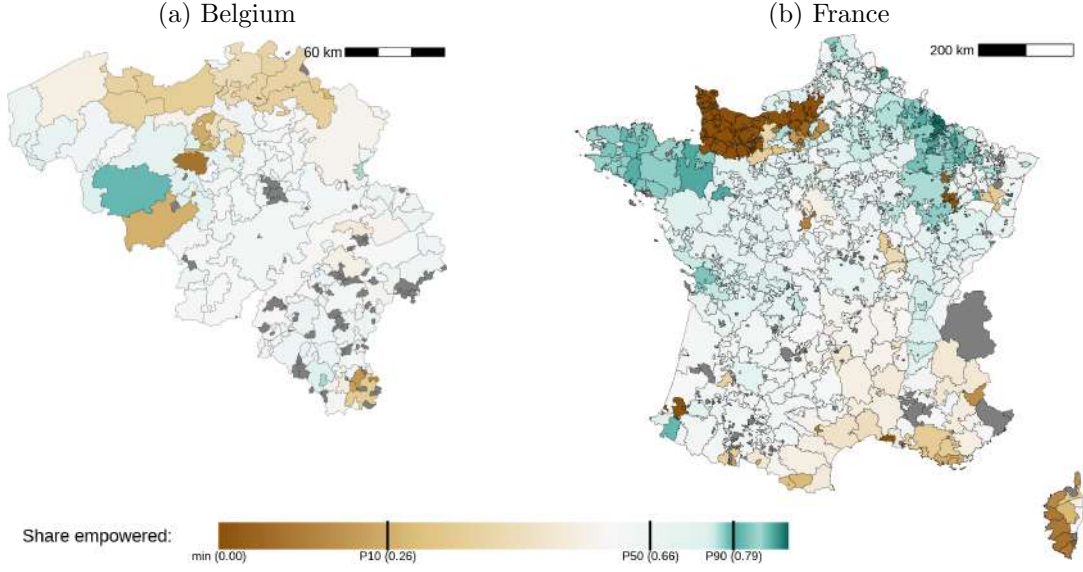


Figure 8: Estimates of the share of empowered celibacy

Notes: Celibacy is decomposed into the share of empowered versus constrained celibacy using the parameters identified in Section 6.3 (see text for details). Grey areas have no data from [Geni.com](https://www.geni.com).

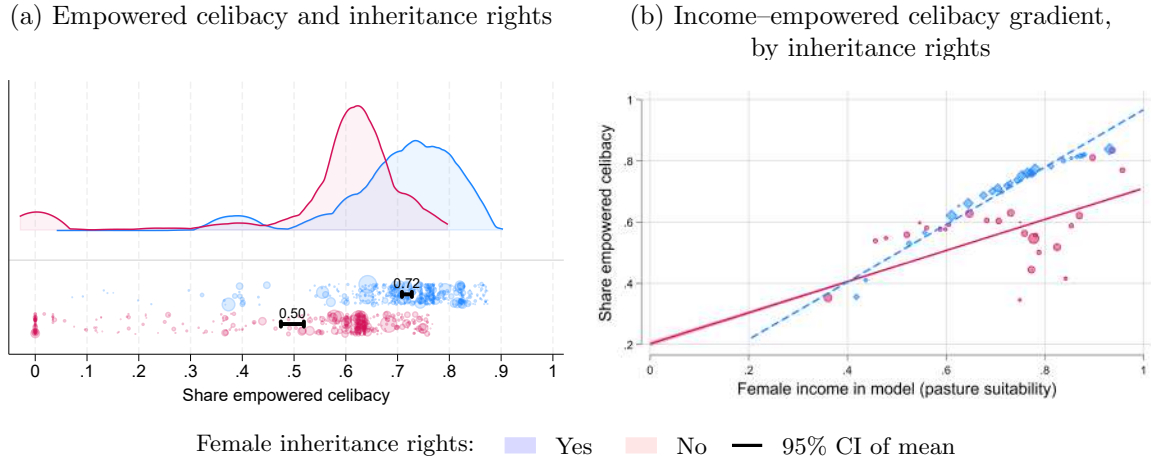


Figure 9: Correlates of female empowered celibacy

Notes: Panel (a) shows a raincloud plot of the estimated share of female empowered celibacy. Kernel density estimates are shown above; weighted observations at the level of judicial districts and exclaves are displayed below. Panel (b) shows equal-size binned scatter plots of the gradient between the estimated share of female empowered celibacy and women's income in the model (pasture suitability index). Variables are residualized by fixed effects for regions, means are added back, and markers proportional to the number of observations in the data.

Counterfactual experiments. In addition to decomposing empowered and constrained celibacy and exploring their correlates, we conduct counterfactual experiments to quantify how different inheritance institutions contributed to female empowerment within the EMP. We consider eight counterfactuals that vary the two dimensions of inheritance institutions: the division rule (partible or impartible) and women's inheritance rights (yes or no). In the first four counterfactuals, we impose each combination universally across all judicial districts and exclaves in France and bootstrapped samples.

Belgium. In the remaining four counterfactuals, we impose one dimension universally while preserving observed local customs in the other. In each of the eight counterfactuals, we recompute the model equilibrium using the estimated parameters in Table 8, holding all local characteristics other than inheritance fixed.

Figure 10 reports the estimated celibacy rates under the eight counterfactual inheritance regimes and, for comparison, under the actual local inheritance customs. The length of each bar corresponds to the aggregate celibacy rate, while the shaded segments show the shares of empowered and constrained celibacy.

Three patterns emerge. First, women’s inheritance rights substantially increase the extent to which celibacy reflects women’s choices. Under the three counterfactuals universally granting women inheritance rights—panels (a), (c), and (e)—the share of empowered celibacy increases from the observed 65.6 percent to 70.1, 70.4, and 70.2 percent, respectively. By contrast, under the three counterfactuals without women’s inheritance rights—panels (b), (d), and (f)—the share of empowered celibacy falls to 47.7, 61.6, and 55.8 percent.

Second, the rule governing the division of assets primarily affects the prevalence of celibacy. Under the three counterfactuals with universal impartible inheritance—panels (c), (d), and (h)—the celibacy rate increases from the observed 9.9 percent to 14.4, 11.8, and 13.4 percent. In contrast, under universal partible inheritance—panels (a), (b), and (g)—it drops to 8.6, 5.5, and 7.4 percent. Importantly, the effect of the asset-division rule on the nature of celibacy crucially depends on women’s inheritance rights: Moving from universally partible to universally impartible inheritance leaves the share of empowered celibacy virtually unchanged—70.1 versus 70.4 percent—when all women have inheritance rights (panels (a) and (c)); increases it significantly—from 47.7 to 61.6 percent—when women do not have inheritance rights; and has modest effects—from 63.6 to 67.2 percent—when women’s inheritance rights are kept at their observed local values (panels (g) and (h)).

In sum, the two dimensions of inheritance institutions play distinct roles: the division rule primarily shapes the prevalence of celibacy, while women’s inheritance rights are particularly important in determining whether celibacy reflects empowerment or economic constraint.

Third, imposing a common inheritance regime substantially reduces regional heterogeneity in the prevalence of empowered celibacy (see Appendix Figure A15 for details). This highlights the importance of local inheritance customs in explaining regional differences in the nature of the EMP.⁵⁷

Overall, these counterfactuals reinforce our central conclusion. Whether the EMP reflected empowered or constrained celibacy depended not only on women’s economic opportunities but also on the legal institutions governing access to family wealth. In particular, women’s inheritance rights emerge as a key institutional determinant: they shape both the prevalence of celibacy and the extent to which celibacy reflects women’s choices rather than economic constraints.

⁵⁷Appendix Figure A16 confirms these three patterns by mapping, for each counterfactual, the change in empowered celibacy relative to that under the observed local inheritance customs.

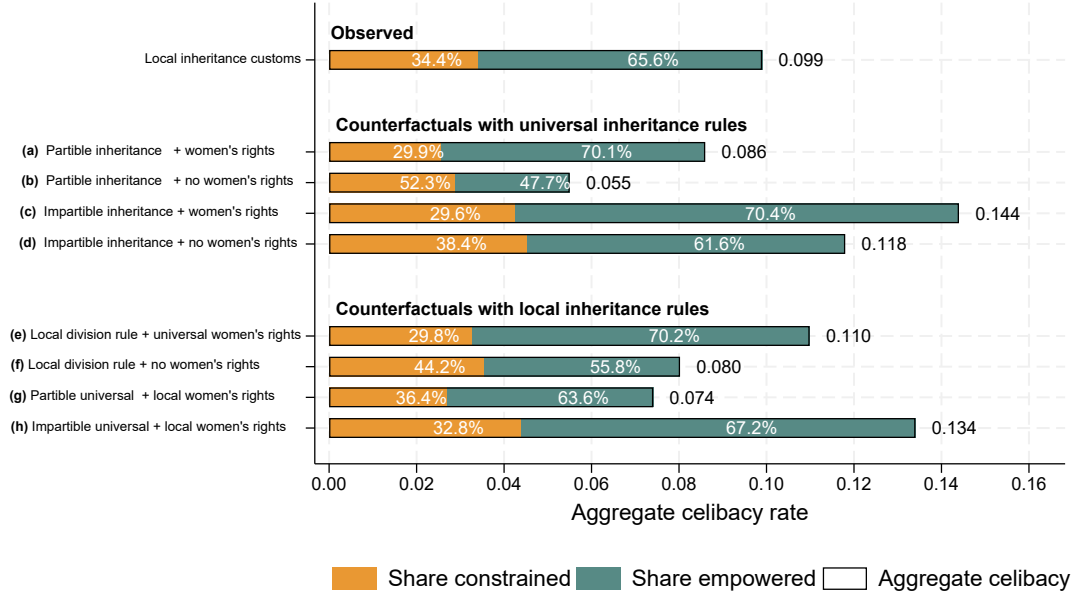


Figure 10: Celibacy under eight counterfactual inheritance regimes

Notes: This figure reports the model-implied aggregate celibacy rate (bars) and the share of empowered (green) and constrained celibacy (orange) for the observed local inheritance customs and eight counterfactual inheritance regimes. Counterfactuals (a)–(d) impose, to all districts, partible inheritance with women’s inheritance rights, partible inheritance without women’s inheritance rights, impartible inheritance with women’s inheritance rights, and impartible inheritance without women’s inheritance rights. Counterfactuals (e) and (f) preserve the local division rule while universally imposing women’s inheritance rights and excluding women from inheritance, respectively. Counterfactuals (g) and (h) preserve the local women’s inheritance rights while universally imposing partible and impartible inheritance, respectively.

7 Conclusion

Centuries before the demographic transition, the European Marriage Pattern (EMP) restricted population growth in Western Europe through late marriage, high lifetime celibacy, and nuclear household formation. Yet, whether celibacy reflected female empowerment or economic constraints on household formation remains debated. We show that these interpretations are not mutually exclusive: which prevailed depended critically on local inheritance institutions.

Our analysis combined a new atlas of local inheritance customs in France and Belgium with crowdsourced genealogies covering 75,000 women born between 1500 and 1750. We documented four novel facts about the EMP, suggesting that celibacy and age at marriage were crucially shaped by inheritance rules. In detail, our findings show that inheritance institutions shaped how economic opportunities affected marriage. Under inegalitarian inheritance, greater opportunities reduced celibacy, consistent with income relaxing constraints on household formation; under egalitarian inheritance, they increased celibacy, consistent with stronger outside options allowing women to remain unmarried. These relationships persisted across centuries, hence reflecting a defining feature of the EMP rather than secular trends or short-run Malthusian fluctuations.

To decompose celibacy into female empowerment and economic constraint, we then developed a theory of marriage and inheritance, and used the new stylized facts to structurally

estimate the model. We find that approximately 65 percent of celibacy reflected choice rather than financial constraint. Counterfactuals further show that women’s inheritance rights determined both the celibacy rate and whether celibacy reflected empowerment or constraint.

These findings change how regional variation in the European Marriage Pattern should be interpreted. High celibacy is not, by itself, evidence of female autonomy or economic hardship: the same demographic behavior can reflect opposite economic forces depending on the institutions governing access to family wealth. Our results thus suggest that the canonical characterization of the EMP—late age at marriage, high lifetime celibacy, and nuclear household formation—misses a crucial, fourth, dimension: whether celibacy was empowered or constrained. Local inheritance institutions were central to determining which form prevailed.

Our results consequently help reconcile contrasting views of the EMP’s relationship with European development. The EMP has been associated with Europe’s rise to riches (De Moor and Van Zanden 2010; Voigtländer and Voth 2013), yet high celibacy and late marriage also prevailed in economically stagnant areas of Europe (Dennison and Ogilvie 2016). We argue that the developmental implications of the EMP depended crucially on local inheritance customs, which ultimately determined whether celibacy reflected economic opportunity or financial hardship. Since roughly two-thirds of celibacy in our setting reflected choice, our estimates lend credence to interpretations emphasizing the EMP as a positive force, while explaining its coexistence with economic stagnation in certain regions. More fundamentally, the inheritance structure prevailing across France and Belgium was itself an important part of their pre-industrial development, because it tilted the EMP toward female empowerment rather than constraint. Establishing how much these distinct forms of the EMP contributed to Europe’s rise to riches remains an important question for future research.

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Appendix A. Additional figures and tables

Table A1: The European Marriage Pattern across countries

	Female age at first marriage		Female lifetime celibacy		Complex households	
	N	Years	N	%	N	%
<i>West of Hajnal line</i>						
Austria	33	26.8	25	28.0	24	19.2
Belgium	197	26.4	17	20.4	6	13.1
Denmark	46	27.8	32	11.3	11	14.9
England	250	25.2	45	11.3	70	15.7
France (northern)	192	25.3	137	11.5	27	16.1
France (central)	11	23.3	23	10.9	5	44.0
France (southern)	46	24.3	73	12.9	30	27.3
Germany	486	26.1	103	11.4	28	12.0
Ireland	74	24.2	53	15.8	16	25.5
Italy (northern)	113	24.1	43	11.8	86	34.4
Italy (southern)	134	22.1	38	12.1	87	20.9
Netherlands	213	26.5	16	9.5	37	17.6
Norway	22	27.1	23	17.3	21	21.9
Spain (northern)	149	24.2	57	10.0	52	20.3
Spain (southern)	16	22.1	22	10.4	5	5.5
Sweden	56	26.6	45	12.8	36	21.4
Switzerland	30	25.9	15	19.6	16	19.9
<i>East of Hajnal line</i>						
Bulgaria	17	19.1	7	0.6	9	36.1
Greece	14	21.9	7	5.3	13	16.7
Hungary	76	20.4	9	4.0	45	51.6
Poland	19	22.8	12	6.2	46	27.0
Russia	57	20.0	24	9.3	69	60.6
Serbia	9	19.6	5	1.1	4	44.9
Slovakia	3	20.9	0	–	2	40.5

Notes: Table reproduced from [Dennison and Ogilvie \(2014, Table 1\)](#). N denotes the number of local-level observations in each cell. Bold rows indicate the countries covered in this paper. “Complex households” refers to the share of households with extended or multiple family units.

Table A2: Fact 1: inheritance and the EMP in rural areas, fixed-effects estimates with four inheritance groups.

		(1)	(2)	(3)	(4)
		<i>Dep. variable = 1 if celibate</i>			
		All	Rare names	H-sample	Off main line
Egalitarian:	Partible + women included	ref.	ref.	ref.	ref.
Inegalitarian:	Impartible + women included	0.018** (0.008)	0.015 (0.010)	−0.017 (0.016)	0.041** (0.017)
	Partible + women excluded	0.022*** (0.007)	0.010 (0.009)	0.024 (0.016)	0.059*** (0.017)
	Impartible + women excluded	0.028*** (0.005)	0.017*** (0.006)	0.027*** (0.010)	0.061*** (0.010)
Decade FE		Y	Y	Y	Y
Birth region FE		Y	Y	Y	Y
Mean dep. variable		0.10	0.08	0.22	0.23
N		70,728	37,312	31,925	26,284

Notes: This table presents estimates of Equation 1, where the egalitarian indicator is replaced by indicators for impartible systems including women, impartible systems excluding women, and partible systems excluding women. The sample is women born in 1500–1750 in rural custom regions whose Geni record can be geo-located. Quality filters in columns (2)–(4) are defined in Section 3.2. Rural custom regions are > 1 km from the centroid of an urban custom settlement. Birth region fixed effects comprise *Généralité* for France, and provinces, independent counties, and duchies for Belgium (see Appendix Figure C2). Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table A3: Fact 2 robustness to urban population and distance to urban custom centroid, fixed-effects estimates.

<i>Dependent variable = 1 if celibate</i>					
	(1)	(2)	(3)	(4)	(5)
Panel A. All (N=4,844)					
Urban custom is egalitarian	0.049*** (0.014)	0.049*** (0.014)	0.101*** (0.021)	0.108*** (0.022)	0.135*** (0.026)
Panel B. Rare names (N=2,843)					
Urban custom is egalitarian	0.036** (0.016)	0.036** (0.016)	0.067*** (0.026)	0.073*** (0.028)	0.104*** (0.032)
Panel C. H-sample (N=2,843)					
Urban custom is egalitarian	0.080*** (0.026)	0.083*** (0.026)	0.177*** (0.036)	0.183*** (0.037)	0.233*** (0.046)
Panel D. Off-main line (N=2,843)					
Urban custom is egalitarian	0.062** (0.025)	0.061** (0.024)	0.128*** (0.037)	0.143*** (0.040)	0.191*** (0.048)
Decade FE	Y	Y	Y	Y	Y
Birth region FE	Y	Y	Y	Y	Y
Population (Buringh)	.	Y	Y	Y	Y
Egalitarian $\times$ Population (Buringh)	.	.	Y	Y	Y
Distance to urban centroid	.	.	.	Y	Y
Egalitarian $\times$ Distance to urban centroid	.	.	.	.	Y

Notes: This table presents estimates of Equation 1, using celibacy as dependent variable along an increasingly stringent set of covariates controlling for: population in levels, the interaction between population and the egalitarian indicator, distance from a woman's birthplace and the urban settlement centroid, and the interaction between distance and the egalitarian indicator. In Panel A, the sample is women born in towns with an urban custom in 1500–1750, whose Geni record can be geo-located, and who died after 40. In Panels B to D, the sample is further restricted by our quality filters (see Section 3.2 for quality filter definitions). Towns with an urban custom are all locations within 1km of urban custom centroid with a population over 5,000 (Buringh 2021). Birth region fixed effects comprise *Généralité* for France, and provinces, independent counties, and duchies for Belgium (see Appendix Figure C2). Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table A4: Pasture suitability and the EMP, estimates by inheritance regime on border sample.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	<i>Dep. Variable = 1 if celibate</i>				<i>Dep. Variable: age at first marriage</i>			
	All	Rare names	H-sample	Off main line	All	Rare names	H-sample	Off main line
<i>A. Inegalitarian inheritance</i>								
Pasture suitability	−0.029 (0.031)	−0.035 (0.037)	−0.135** (0.064)	−0.228*** (0.070)	−0.667 (0.468)	−0.094 (0.660)	−0.517 (0.723)	−1.151 (0.807)
<i>B. Egalitarian inheritance</i>								
Pasture suitability	0.101*** (0.031)	0.073* (0.037)	0.089 (0.058)	0.203*** (0.062)	0.016 (0.494)	0.561 (0.706)	−0.256 (0.729)	−0.739 (0.820)
<i>p</i> -value inegal. = egal.	0.003***	0.042**	0.009***	0.000***	0.315	0.498	0.799	0.720
Decade FE	Y	Y	Y	Y	Y	Y	Y	Y
Birth region FE	Y	Y	Y	Y	Y	Y	Y	Y
Mean dep. variable	0.10	0.08	0.22	0.22	24.04	24.13	24.09	24.54
N	36,689	19,250	17,289	14,531	28,730	14,765	13,854	10,776

Notes: This table presents estimate of Equation (4) restricting the sample to women born in adjacent judicial districts, where one district follows egalitarian inheritance and the other inegalitarian inheritance (see Figure 5). In detail, the sample comprises women born in 1500–1750 rural custom regions in contiguous judicial districts and exclaves with different inheritance rules, whose Geni record can be geo-located, who died after age 40, and whose birthplace is covered by the data on pasture suitability. Columns (1)–(4) examine definite celibacy. Columns (5)–(8) examine age at first marriage among women who married during reproductive age (15 to 35). Quality filters in columns (2)–(4) and (5)–(8) are defined in Section 3.2. Rural custom regions are > 1 km from the centroid of an urban custom settlement. Birth region fixed effects comprise *Généralité* for France, and provinces, independent counties, and duchies for Belgium (see Appendix Figure C2). Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

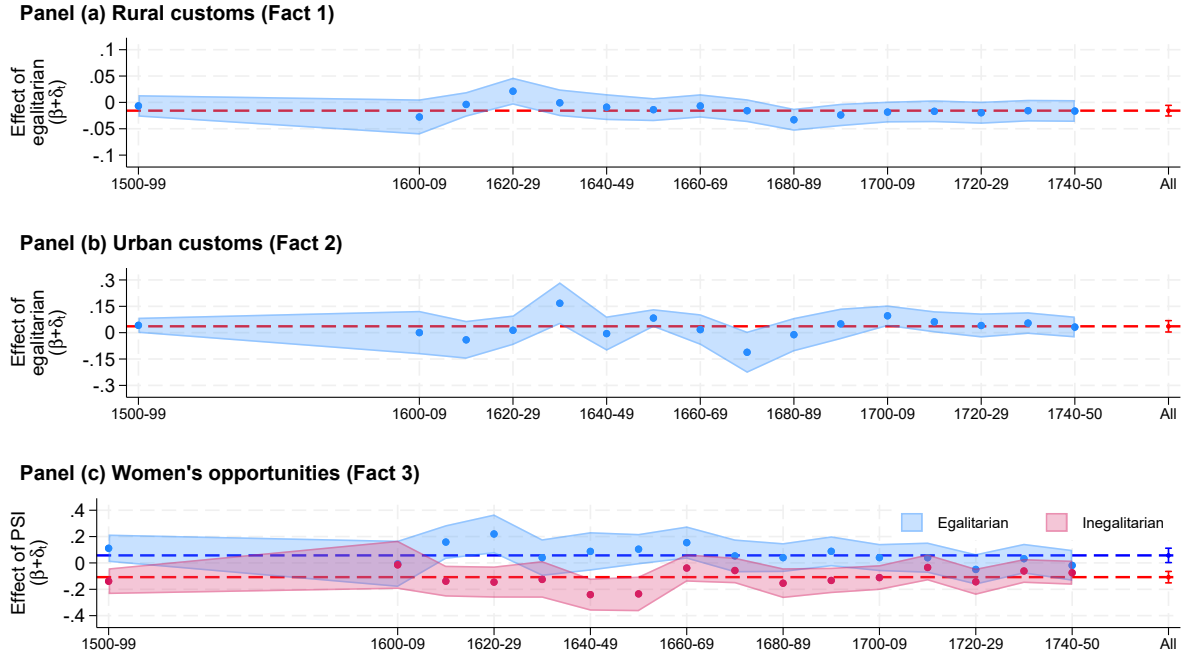


Figure A1: Fact 4: time effects, rare-names quality filter

Notes: This figure displays estimates from Equations (5) and (6). The dependent variable is celibacy. The sample is women born in 1500–1750 in Belgium and France, whose Geni record can be geo-located, who died after 40, and who satisfy the rare-names quality filter (see Section 3.2 for details). Panels (a) and (c) consider 37,312 women born in rural custom regions—37,306 with data on pasture suitability; Panel (b) considers 2,843 women born in towns with an urban custom (see Tables 2 and 4 for details). Points represent estimates for $\beta + \delta_k$, the decade-specific effect of egalitarian inheritance (Panels (a) and (b)) and of pasture suitability (Panel (c)) on celibacy. Shaded areas are 95% confidence intervals. Horizontal dashed lines report baseline estimate from pooling all cohorts. All birth decades between 1500 and 1599 are grouped.

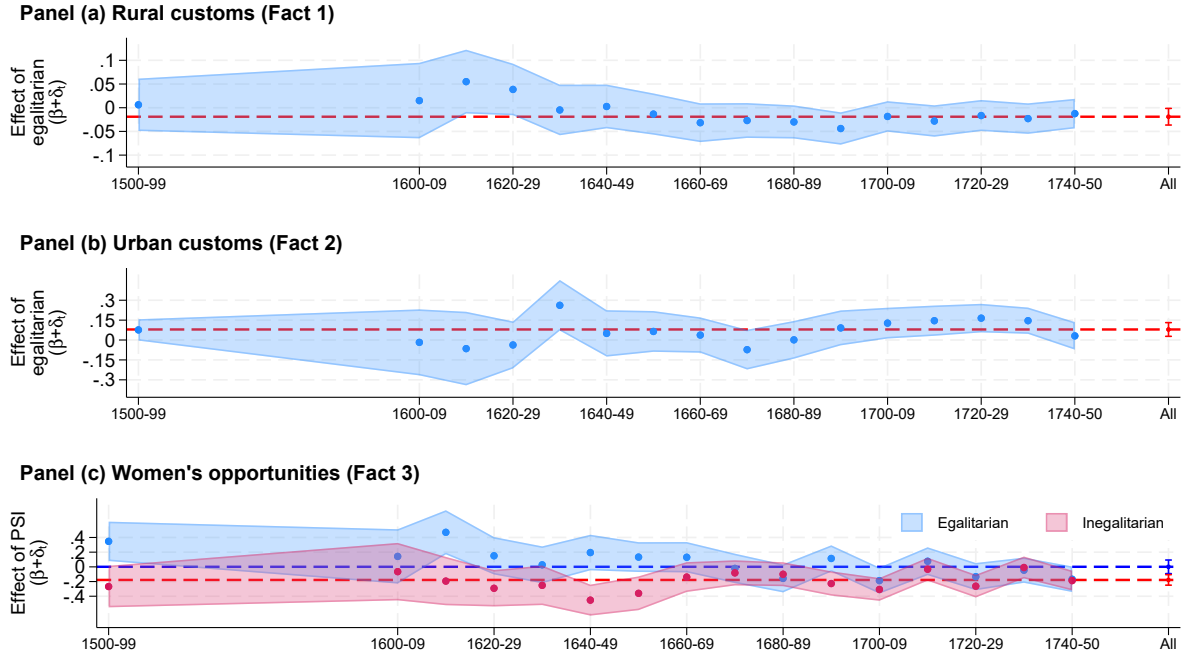


Figure A2: Fact 4: time effects, h-sample quality filter

Notes: This figure displays estimates from Equations (5) and (6). The dependent variable is celibacy. The sample is women born in 1500–1750 in Belgium and France, whose Geni record can be geo-located, who died after 40, and who satisfy the h-sample quality filter (see Section 3.2 for details). Panels (a) and (c) consider 31,925 women born in rural custom regions—31,922 with data on pasture suitability; Panel considers (b) 2,339 women born in towns with an urban custom (see Tables 2 and 4 for details). Points represent estimates for $\beta + \delta_k$, the decade-specific effect of egalitarian inheritance (Panels (a) and (b)) and of pasture suitability (Panel (c)) on celibacy. Shaded areas are 95% confidence intervals. Horizontal dashed lines report baseline estimate from pooling all cohorts. All birth decades between 1500 and 1599 are grouped.

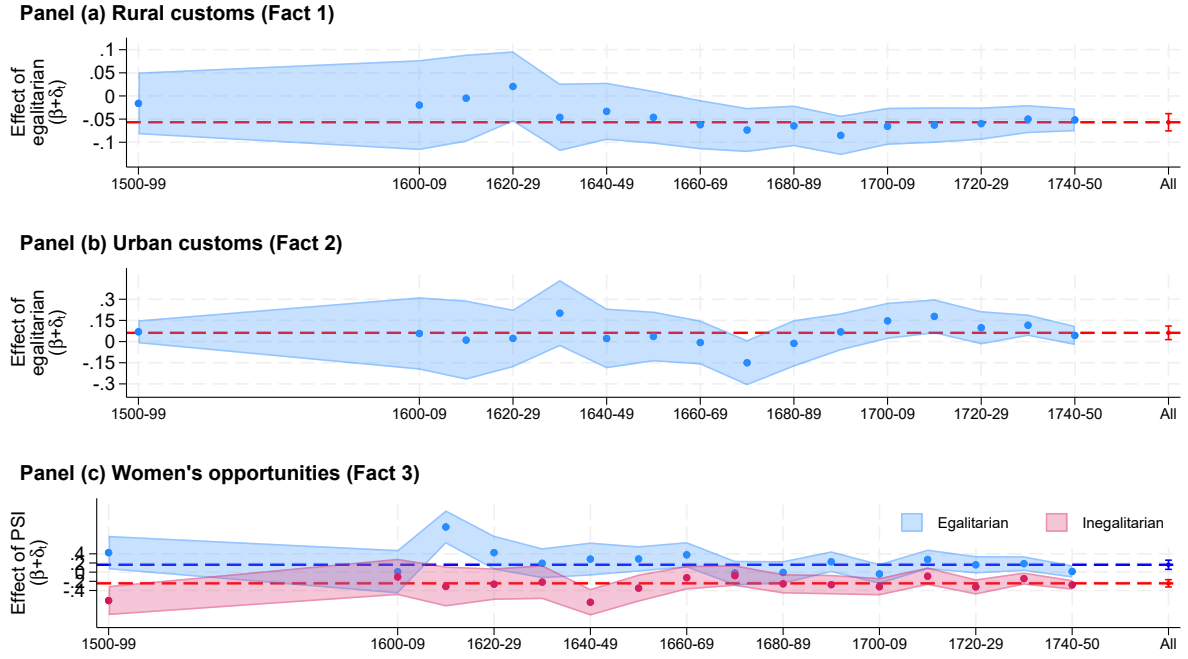


Figure A3: Fact 4: time effects, off main line quality filter

Notes: This figure displays estimates from Equations (5) and (6). The dependent variable is celibacy. The sample is women born in 1500–1750 in Belgium and France, whose Geni record can be geo-located, who died after 40, and who satisfy the off-main line quality filter (see Section 3.2 for details). Panels (a) and (c) consider 26,284 women born in rural custom regions—26,280 with data on pasture suitability; Panel (b) considers 2,164 women born in towns with an urban custom (see Tables 2 and 4 for details). Points represent estimates for $\beta + \delta_k$, the decade-specific effect of egalitarian inheritance (Panels (a) and (b)) and of pasture suitability (Panel (c)) on celibacy. Shaded areas are 95% confidence intervals. Horizontal dashed lines report baseline estimate from pooling all cohorts. All birth decades between 1500 and 1599 are grouped.

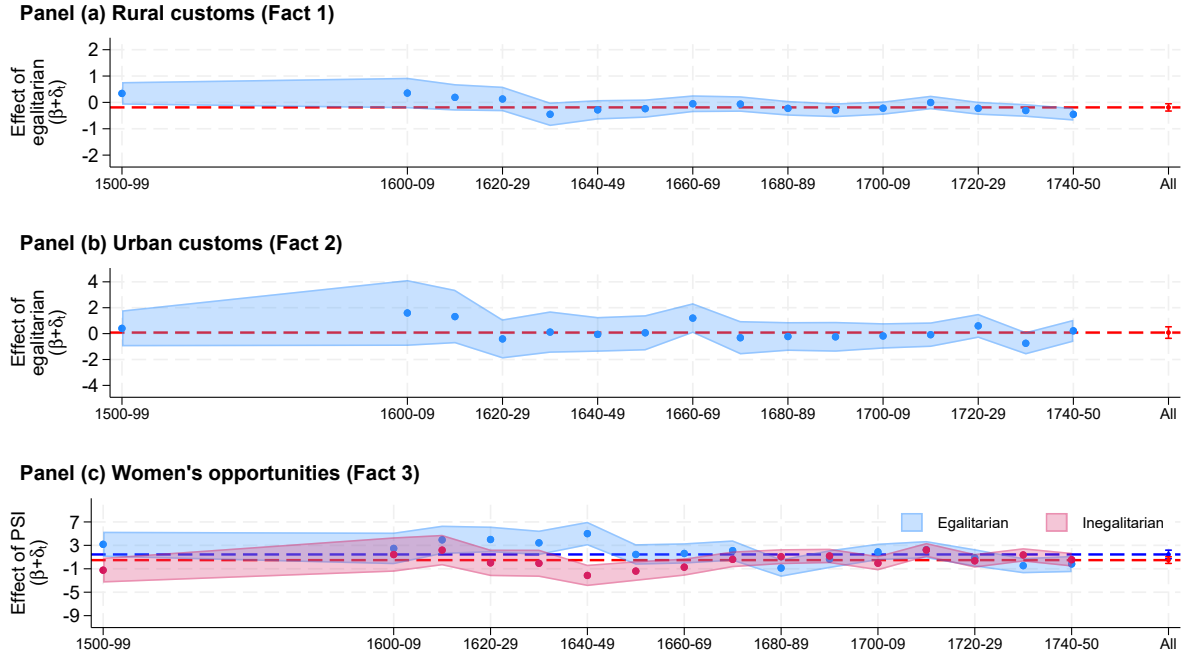


Figure A4: Fact 4: time effects, age at first marriage

Notes: This figure displays estimates from Equations (5) and (6). The dependent variable is age at first marriage. The sample is women born in 1500–1750 in Belgium and France, whose Geni record can be geo-located, who died after 40, and who married during reproductive age (15 to 35). Panels (a) and (c) consider 58,794 women in born rural custom regions—58,777 with data on pasture suitability; Panel (b) considers 3,915 women born in towns with an urban custom (see Tables 2 and 4 for details). Points represent estimates for $\beta + \delta_k$, the decade-specific effect of egalitarian inheritance (Panels (a) and (b)) and of pasture suitability (Panel (c)) on age at first marriage. Shaded areas are 95% confidence intervals. Horizontal dashed lines report baseline estimate from pooling all cohorts. All birth decades between 1500 and 1599 are grouped.

Table A5: Fact 1 for men: Inheritance and male celibacy in rural areas, fixed-effect estimates.

	(1)	(2)	(3)	(4)
	<i>Dep. variable = 1 if celibate</i>			
	All	Rare names	H-sample	Off main line
Egalitarian inheritance	−0.018*** (0.004)	−0.007 (0.005)	−0.016** (0.007)	−0.042*** (0.008)
Decade FE	Y	Y	Y	Y
Birth region FE	Y	Y	Y	Y
Mean dep. variable	0.09	0.08	0.19	0.20
Effect size (β/mean)	−0.19	−0.09	−0.09	−0.21
N	91,010	46,894	44,945	35,320

Notes: This table presents estimates of Equation 1 on an analogous sample of men born in rural custom regions in 1500-1750, whose Geni record can be geo-located, and who died after 40. Quality filters in columns (2)–(4) are defined in Section 3.2. Rural custom regions are > 1 km from the centroid of an urban custom settlement. Birth region fixed effects comprise *Généralité* for France, and provinces, independent counties, and duchies for Belgium (see Appendix Figure C2). Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table A6: Fact 2 for men: Urban inheritance customs and male celibacy, fixed-effect estimates.

	(1)	(2)	(3)	(4)
	<i>Dep. variable = 1 if celibate</i>			
	All	Rare names	H-sample	Off main line
Urban custom is egalitarian	0.029*** (0.011)	0.026** (0.013)	0.039** (0.019)	0.057*** (0.019)
Decade FE	Y	Y	Y	Y
Birth region FE	Y	Y	Y	Y
Mean dep. variable	0.08	0.06	0.15	0.13
Effect size (β/mean)	0.36	0.40	0.26	0.43
N	6,584	3,856	3,475	3,136

Notes: This table presents estimates of Equation 1 on an analogous sample of men born in towns with an urban custom in 1500–1750, whose Geni record can be geo-located, and who died after 40. Quality filters in columns (2)–(4) are defined in Section 3.2. Towns with an urban custom are all locations within 1km of urban custom centroid with a population over 5,000 (Buringh 2021). Birth region fixed effects comprise *Généralité* for France, and provinces, independent counties, and duchies for Belgium (see Appendix Figure C2). Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table A7: Fact 3 for men: Women’s labor-market opportunities and male celibacy, fixed-effect estimates.

	(1)	(2)	(3)	(4)
	<i>Dep. variable = 1 if celibate</i>			
	All	Rare names	H-sample	Off main line
<i>A. Inegalitarian inheritance</i>				
Pasture suitability	−0.095*** (0.016)	−0.074*** (0.020)	−0.148*** (0.029)	−0.208*** (0.034)
<i>B. Egalitarian inheritance</i>				
Pasture suitability	0.077*** (0.020)	0.068*** (0.025)	0.073** (0.036)	0.197*** (0.043)
<i>p</i> -value inegal. = egal.	0.000***	0.000***	0.000***	0.000***
Decade FE	Y	Y	Y	Y
Birth region FE	Y	Y	Y	Y
Mean dep. variable	0.09	0.08	0.19	0.2
N	90,992	46,884	44,939	35,316

Notes: This table presents estimates of Equation 4 on an analogous sample of men born in rural custom regions in 1500-1750, whose Geni record can be geo-located, who died after 40, and whose birthplace is covered by the data on pasture suitability. Quality filters in columns (2)–(4) are defined in Section 3.2. Rural custom regions are > 1 km from the centroid of an urban custom settlement. Birth region fixed effects comprise *Généralité* for France, and provinces, independent counties, and duchies for Belgium (see Appendix Figure C2). Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

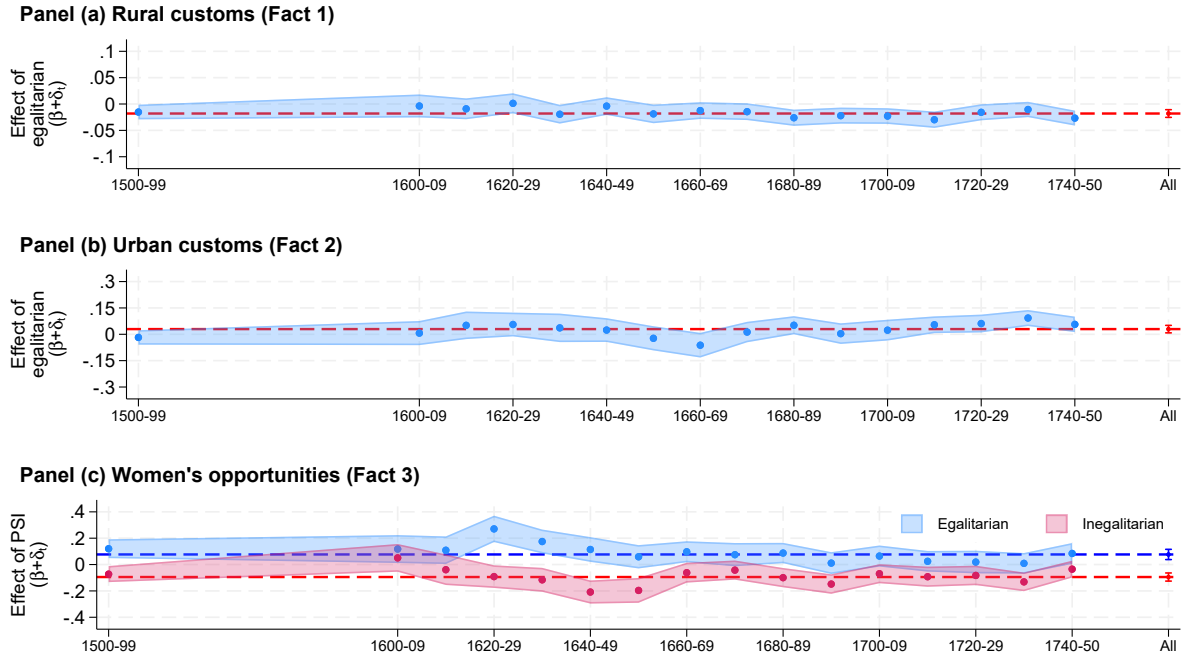


Figure A5: Fact 4 for men: Time effects on male celibacy

Notes: This figure displays estimates from Equations (5) and (6) on an analogous sample of men born in 1500–1750 in Belgium and France, whose Geni record can be geo-located, and who died after 40. Panels (a) and (c) consider 91,010 men in rural custom regions—90,992 with data on pasture suitability; Panel (b) 6,584 men born in towns with an urban custom (see Tables A5 and A6 for details). The dependent variable is celibacy. Points represent estimates for $\beta + \delta_k$, the decade-specific effect of egalitarian inheritance (Panels (a) and (b)) and of pasture suitability (Panel (c)) on male celibacy. Shaded areas are 95% confidence intervals. Horizontal dashed lines report baseline estimate from pooling all cohorts. All birth decades between 1500 and 1599 are grouped.

Table A8: Fact 1: inheritance and the EMP in rural areas, flexible-trends specification.

	All (1)	Rare names (2)	H-sample (3)	Off main line (4)
<i>Panel A. Dep. variable = 1 if celibate</i>				
Egalitarian inheritance	−0.026*** (0.004)	−0.017*** (0.005)	−0.020** (0.009)	−0.060*** (0.010)
Mean dep. variable	0.10	0.08	0.22	0.23
Effect size (β/mean)	−0.27	−0.22	−0.09	−0.26
N	70,626	37,205	31,799	26,159
<i>Panel B. Variable is age at first marriage</i>				
Egalitarian inheritance	−0.172** (0.071)	−0.217** (0.097)	−0.090 (0.106)	−0.306** (0.119)
Mean dep. variable	23.83	23.83	23.91	24.34
Effect size (β/mean)	−0.01	−0.01	0.00	−0.01
N	58,686	30,424	26,877	20,654
Decade FE	Y	Y	Y	Y
Birth region FE	Y	Y	Y	Y
Decade $\times$ Birth region FE	Y	Y	Y	Y

Notes: This table presents estimates of Equation (1) augmented with region-by-birth-decade fixed effects. These flexibly absorb time-varying unobservable factors that differ across regions, allowing celibacy to follow distinct trends depending on local economic, religious, political, or geographic conditions. The sample is women born in 1500–1750 in rural custom regions, whose Geni record can be geo-located, and who died after age 40. Panel A examines definite celibacy. Panel B examines age at first marriage among women who married during reproductive age (15 to 35). Quality filters in columns (2)–(4) are defined in Section 3.2. Rural custom regions are > 1 km from the centroid of an urban custom settlement. Birth region fixed effects comprise *Généralité* for France, and provinces, independent counties, and duchies for Belgium (see Appendix Figure C2). Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A9: Fact 2: urban inheritance customs and the EMP, flexible-trends specification.

	All (1)	Rare names (2)	H-sample (3)	Off main line (4)
<i>Panel A. Dep. variable = 1 if celibate</i>				
Urban custom is egalitarian	0.050*** (0.015)	0.041** (0.018)	0.085*** (0.028)	0.057** (0.027)
Mean dep. variable	0.09	0.07	0.19	0.18
Effect size (β/mean)	0.54	0.60	0.45	0.33
N	4,769	2,773	2,261	2,102
<i>Panel B. Dep. Variable is age at first marriage</i>				
Urban custom is egalitarian	0.160 (0.237)	−0.120 (0.331)	0.511 (0.348)	0.335 (0.366)
Mean dep. variable	24.82	24.77	24.82	25.33
Effect size (β/mean)	0.01	0.00	0.02	0.01
N	3,819	2,138	1,839	1,641
Decade FE	Y	Y	Y	Y
Birth region FE	Y	Y	Y	Y
Decade $\times$ Birth region FE	Y	Y	Y	Y

Notes: This table presents estimates of Equation (1) augmented with region-by-birth-decade fixed effects. These flexibly absorb time-varying unobservable factors that differ across regions, allowing celibacy to follow distinct trends depending on local economic, religious, political, or geographic conditions. The sample is women born in towns with an urban custom in 1500–1750, whose Geni record can be geo-located, and who died after age 40. Panel A examines definite celibacy. Panel B examines age at first marriage among women who married during reproductive age (15 to 35). Quality filters in columns (2)–(4) are defined in Section 3.2. Towns with an urban custom are all locations within 1km of urban custom centroid with a population over 5,000 (Buringh 2021). Birth region fixed effects comprise *Généralité* for France, and provinces, independent counties, and duchies for Belgium (see Appendix Figure C2). Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A10: Fact 3: women's labor-market opportunities and the EMP, flexible-trends specification.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	<i>Dep. Variable = 1 if celibate</i>				<i>Dep. Variable: age at first marriage</i>			
	All	Rare names	H-sample	Off main line	All	Rare names	H-sample	Off main line
<i>A. Inegalitarian inheritance</i>								
Pasture suitability	−0.111***	−0.117***	−0.187***	−0.235***	0.512*	0.705*	0.170	0.149
	(0.019)	(0.023)	(0.037)	(0.042)	(0.289)	(0.387)	(0.453)	(0.527)
<i>B. Egalitarian inheritance</i>								
Pasture suitability	0.057**	0.050*	−0.005	0.167***	1.647***	1.738***	1.680***	1.467**
	(0.024)	(0.029)	(0.048)	(0.052)	(0.375)	(0.529)	(0.572)	(0.651)
<i>p</i> -val. ineg.= egal.	0.000***	0.000***	0.003***	0.000***	0.017**	0.115	0.039**	0.116
Decade FE	Y	Y	Y	Y	Y	Y	Y	Y
Birth region FE	Y	Y	Y	Y	Y	Y	Y	Y
Decade × Birth region FE	Y	Y	Y	Y	Y	Y	Y	Y
Mean dep. variable	0.10	0.08	0.22	0.23	23.83	23.83	23.91	24.34
N	70,579	37,156	31,744	26,095	58,622	30,365	26,818	20,592

Notes: This table presents estimates of Equation (4) augmented with region-by-birth-decade fixed effects. These flexibly absorb time-varying unobservable factors that differ across regions, allowing celibacy to follow distinct trends depending on local economic, religious, political, or geographic conditions. The sample is women born in 1500–1750 in rural custom regions, whose Geni record can be geo-located, who died after age 40, and whose birthplace is covered by the data on pasture suitability. Columns 1–4 examine definite celibacy. Columns 5–8 examine age at first marriage among women who married during reproductive age (15 to 35). Quality filters in columns (2)–(4) and (6)–(8) are defined in Section 3.2. Rural custom regions are > 1 km from the centroid of an urban custom settlement. Birth region fixed effects comprise *Généralité* for France, and provinces, independent counties, and duchies for Belgium (see Appendix Figure C2). Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

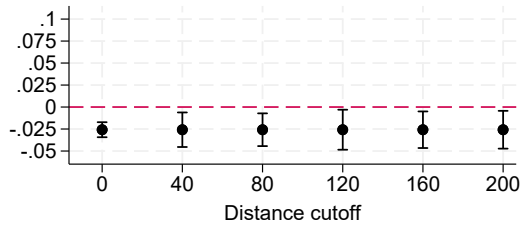
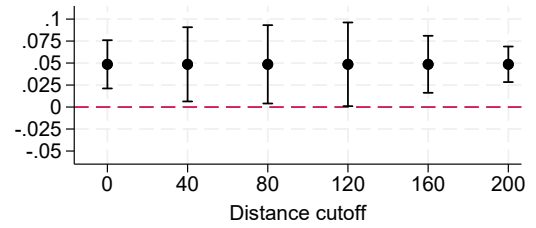
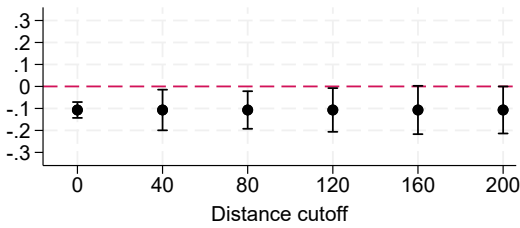
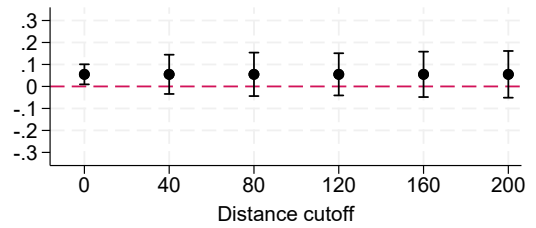
(a) Fact 1*Estimate of egalitarian on celibacy (rural)***(b) Fact 2***Estimate of egalitarian on celibacy (urban)***(c) Fact 3***Estimate of pasture on celibacy (inegalitarian areas)***(d) Fact 3***Estimate of pasture on celibacy (egalitarian areas)*

Figure A6: Conley-adjusted standard errors with different distance cutoffs.

Notes: This figure reports estimates from Equation (1) (Facts 1 and 2) and Equation (4) (Fact 3) with standard errors adjusted for spatial autocorrelation. Panel (a) shows the effect of egalitarian inheritance on celibacy in rural areas (Fact 1); Panel (b) the corresponding effect in urban areas (Fact 2); and Panels (c) and (d) the effect of women's labor-market opportunities on celibacy in rural inegalitarian and egalitarian inheritance areas (Fact 3). The distance cutoffs are the points from which the spatial error correlation is assumed to be 0. The sample is women born in 1500–1750 in Belgium and France, whose Geni record can be geo-located, and who died after 40. Panels (a) and (c)-(d) consider 70,728 women born in rural custom regions—70,717 with data on pasture suitability; Panel (b) considers 4,844 women born in towns with an urban custom (see Tables 2 and 4 for details). Coefficients and spatially-adjusted errors calculated using the `acreg` Stata command (Colella et al. 2019).

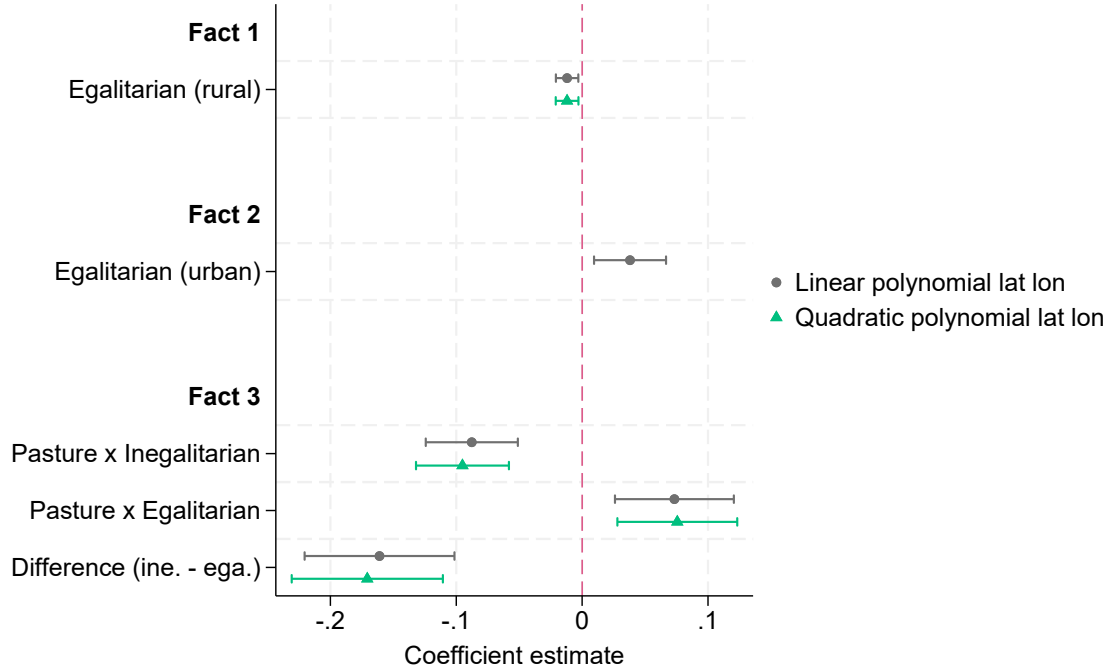
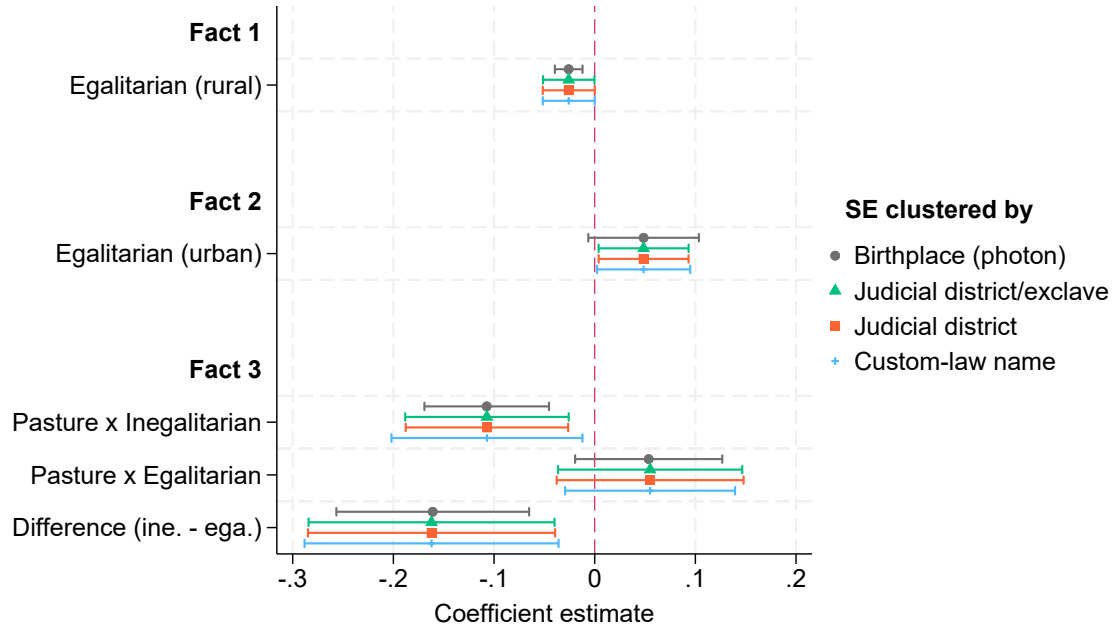


Figure A7: Robustness of Facts 1–3 to controlling for spatial trends.

Notes: This figure reports estimates from Equations (1) (Facts 1 and 2) and (4) (Fact 3) including two spatial trends controls: Black is for a linear polynomial in latitude (x) and longitude (y), i.e., $x + y + xy$, and green is for a quadratic polynomial in latitude and longitude, i.e., $x + y + xy + x^2 + y^2$. The dependent variable is celibacy. We show the estimated effect of egalitarian inheritance on celibacy in rural areas (Fact 1); the corresponding effect in urban areas (Fact 2); and the effect of women's labor-market opportunities on celibacy in rural inegalitarian and egalitarian inheritance areas, as well as the differential effect across inheritance systems (Fact 3). The sample is women born in 1500–1750 in Belgium and France, whose Geni record can be geo-located, and who died after 40. Facts 1 and 3 consider 70,728 women born in rural custom regions—70,717 with data on pasture suitability; Fact 2 considers 4,844 women born in towns with an urban custom (see Tables 2 and 4 for details). We do not report results with the quadratic polynomial for Fact 2 because, in the urban customs sample, inheritance varies by town (i.e., by latitude-longitude pairs). Hence, the quadratic terms for latitude and longitude leads to multicollinearity; 95% confidence levels reported.

(a) All



(b) Rare names

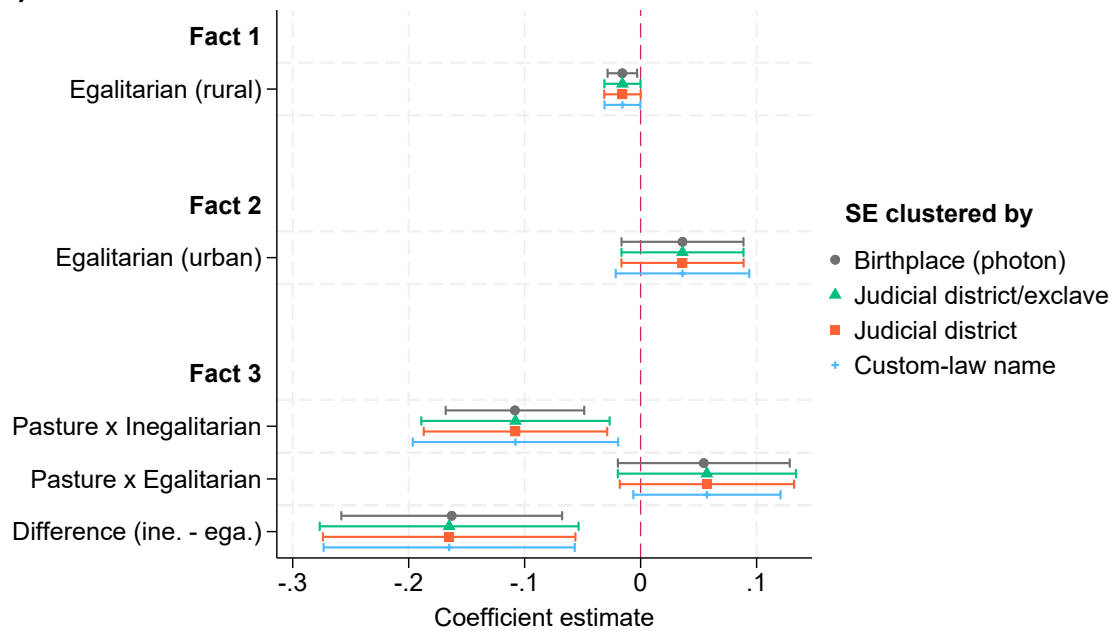
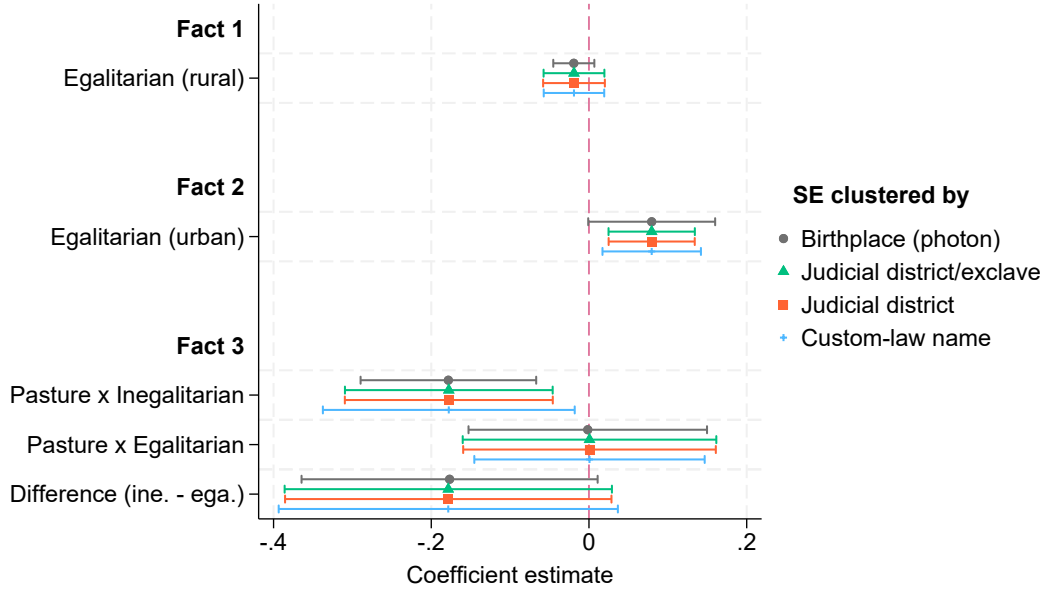


Figure A8: Robustness to alternative ways of clustering standard errors.

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(c) H-sample



(d) Off main line

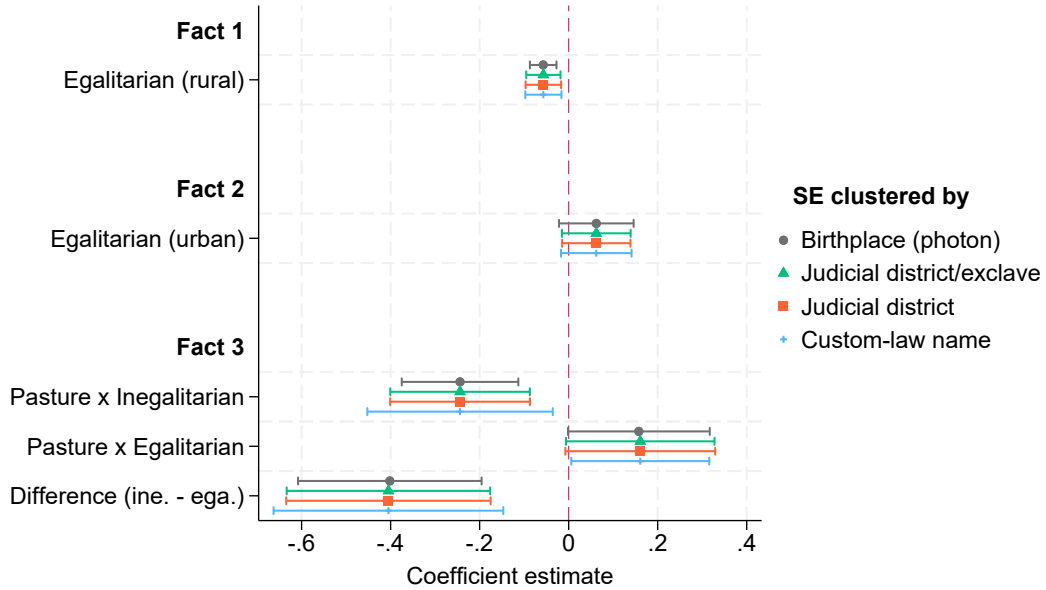


Figure A8: Robustness to alternative ways of clustering standard errors (*continued*).

Notes: This figure reports estimates from Equations (1) (Facts 1 and 2) and (4) (Fact 3) with cluster-robust standard errors by four geographic units at which treatment, inheritance, varies: birthplaces from Photon geocoder (gray circle), judicial district territories and exclaves (green triangle), judicial districts (orange square), and custom-law names (blue cross). The dependent variable is celibacy. We show the effect of egalitarian inheritance on celibacy in rural (Fact 1) and urban areas (Fact 2); and the effect of women's labor-market opportunities on celibacy in rural inegalitarian and egalitarian areas, as well as the differential effect (Fact 3). The sample is women born in 1500–1750 in Belgium and France, whose Geni record can be geo-located, and who died after 40. Fact 1 considers 70,728 women born in rural custom regions, with 14,056 photon-birthplace clusters, 995 judicial district and exclaves' clusters, and 538 judicial district clusters. Fact 2 considers 4,844 women born in towns with an urban custom, with 300 photon-birthplace clusters, 75 judicial district and exclaves' clusters, and 72 judicial district clusters. Fact 3 considers 70,717 women born in rural custom regions with data on pasture suitability, with 14,053 photon-birthplace clusters, 992 judicial district and exclaves' clusters, and 538 judicial district clusters. See Tables 2 and 4 for definitions of rural custom regions and towns with an urban custom. Panels (b) to (d) further restrict the sample by three quality filters for crowdsourced genealogies (see Section 3.2 for definitions and Tables 2 to 5 for sample sizes); 95% confidence levels reported.

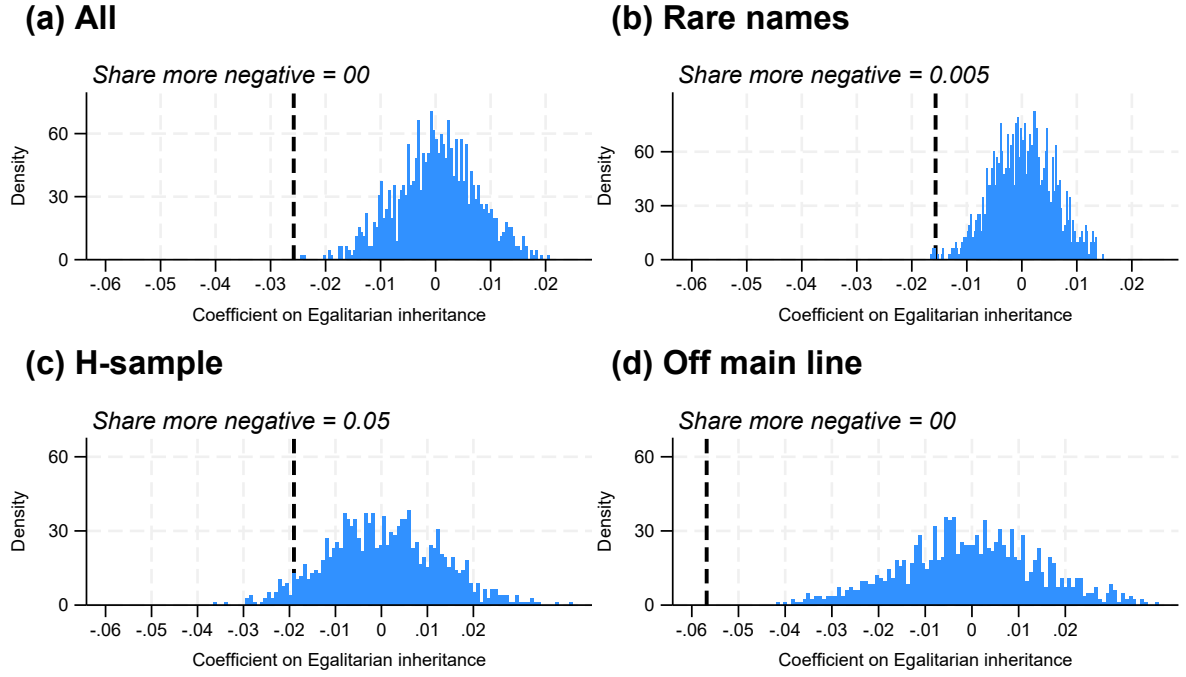


Figure A9: Fact 1: inheritance and the EMP in rural areas, permutation tests.

Notes: This figure plots 1,000 estimated coefficients for β in Equation (1), where we reshuffle the indicator for rural egalitarian customs, $\mathbf{1}[\text{Egalitarian}_j]$, across the 992 judicial districts and judicial district exclaves in our database. Vertical lines indicate the “true” β -estimate for the effect of egalitarian inheritance on celibacy in rural areas. The dependent variable is celibacy. In Panel (a), the sample is 70,728 women born in 1500–1750 in rural custom regions, whose Geni record can be geo-located, and who died after 40. Panel (b) considers 37,312 women satisfying the rare-names quality filter; Panel (c) 31,925 women satisfying the h-sample quality filter; and Panel (d) 26,284 women satisfying the off-main line quality filter. See Section 3.2 for details on the quality filters. Rural custom regions are > 1 km from the centroid of an urban custom settlement.

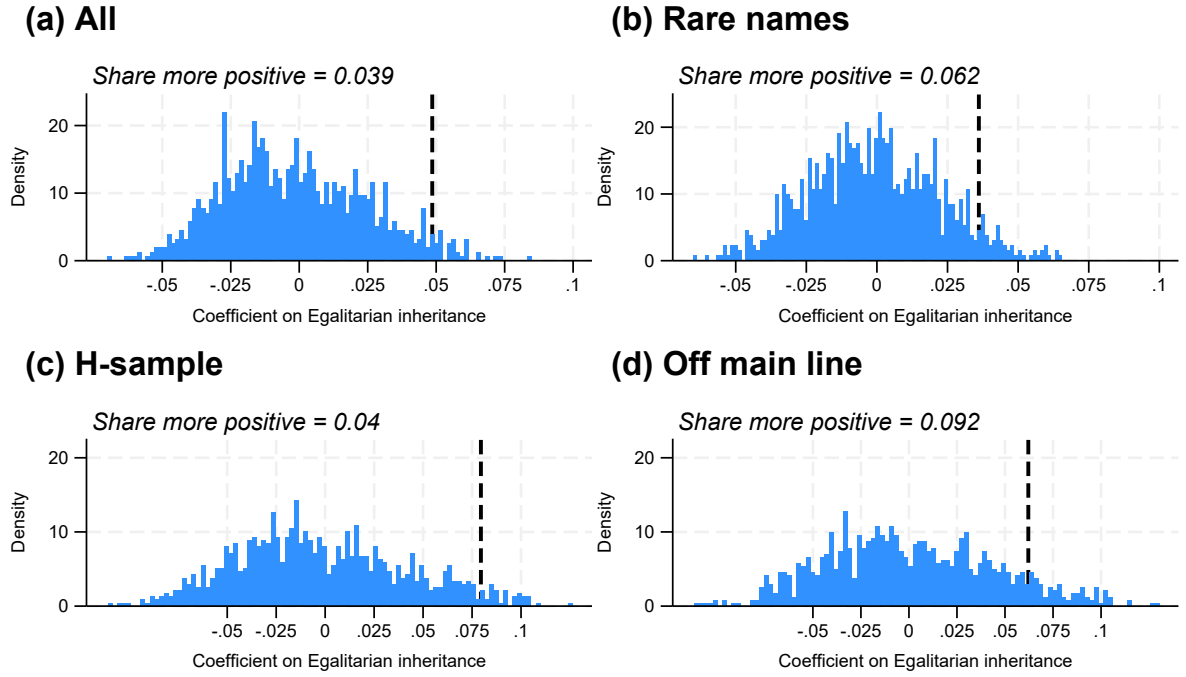


Figure A10: Fact 2: urban inheritance customs and the EMP, permutation tests.

Notes: This figure plots 1,000 estimated coefficients for β in Equation (1), where we reshuffle the indicator for urban egalitarian customs, $1[\text{Egalitarian}_j]$, across all the towns with urban customs in our database. Vertical lines indicate the “true” β -estimate for the effect of egalitarian urban inheritance customs on celibacy. The dependent variable is celibacy. In Panel (a), the sample is 4,844 women born in 1500–1750 in towns with an urban custom, whose Geni record can be geo-located, and who died after 40. Panel (b) considers 2,843 women satisfying the rare-names quality filter; Panel (c) 2,339 women satisfying the h-sample quality filter; and Panel (d) 2,164 women satisfying the off-main line quality filter. See Section 3.2 for details on the quality filters. Towns with an urban custom are all locations within 1km of urban custom centroid with a population over 5,000 (Buringh 2021).

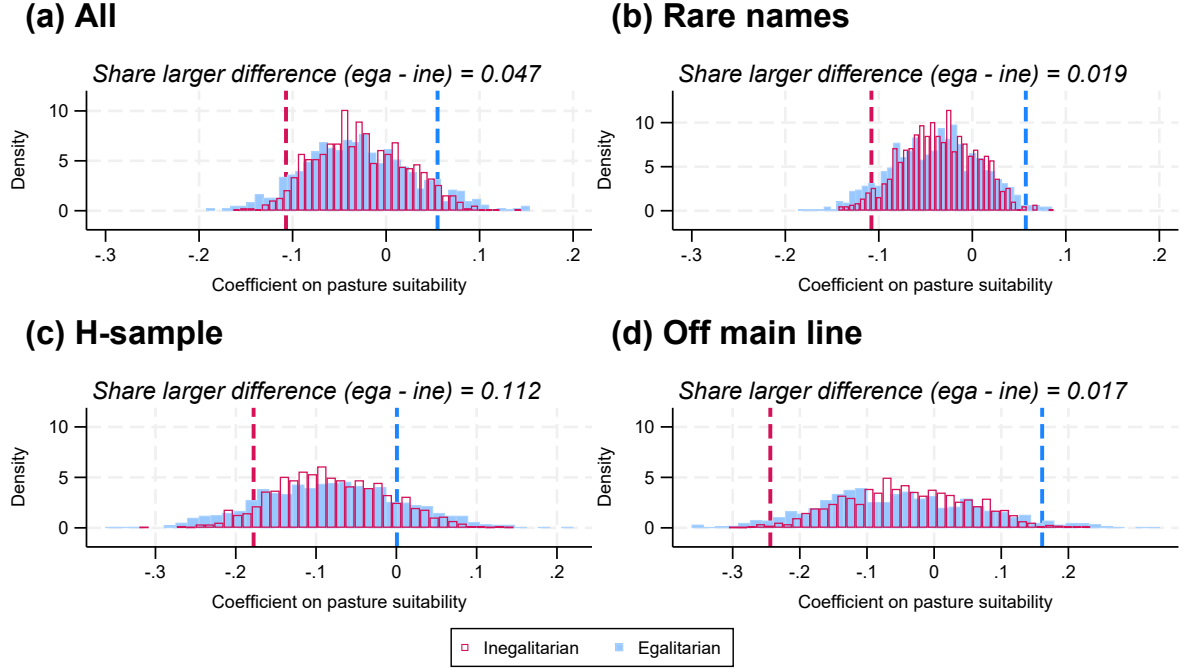


Figure A11: Fact 3: women’s labor-market opportunities and the EMP, permutation tests.

Notes: This figure plots 1,000 estimated coefficients for the effect of women’s labor-market opportunities on celibacy under egalitarian (γ_1) and inegalitarian (γ_0) inheritance. These are estimated from Equation (4), where we reshuffle the indicator for rural egalitarian customs, $1[\text{Egalitarian}_j]$, across the 992 judicial districts and judicial district exclaves in our database. Vertical lines indicate the “true” γ_0 and γ_1 estimates. The dependent variable is celibacy and the proxy for women’s labor-market opportunities is pasture suitability. In Panel (a), the sample is 70,717 women born in 1500–1750 in rural custom regions, whose Geni record can be geo-located, who died after 40, and whose birthplace is covered by the data on pasture suitability. Panel (b) considers 37,306 women satisfying the rare-names quality filter; Panel (c) 31,922 women satisfying the h-sample quality filter; and Panel (d) 26,280 women satisfying the off-main line quality filter. See Section 3.2 for details on the quality filters. Rural custom regions are > 1 km from the centroid of an urban custom settlement.

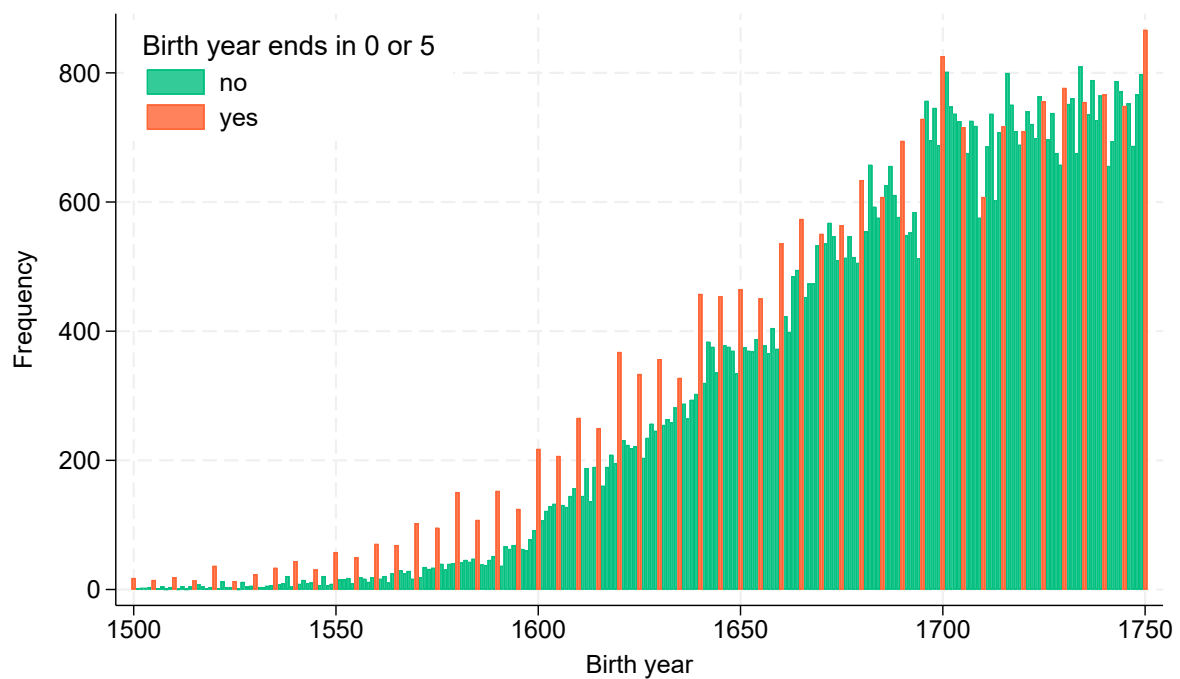


Figure A12: Birth-year heaping in [Geni.com](https://geni.com)

Notes: This figure plots the frequency distribution of observations in the Geni data, by birth year. Birth years ending in 0 or 5 are highlighted in orange. The sample is 79,590 women born in 1500–1750 in France and Belgium in rural custom areas or in towns with an urban custom, whose Geni record can be geo-located, and who died after 40.

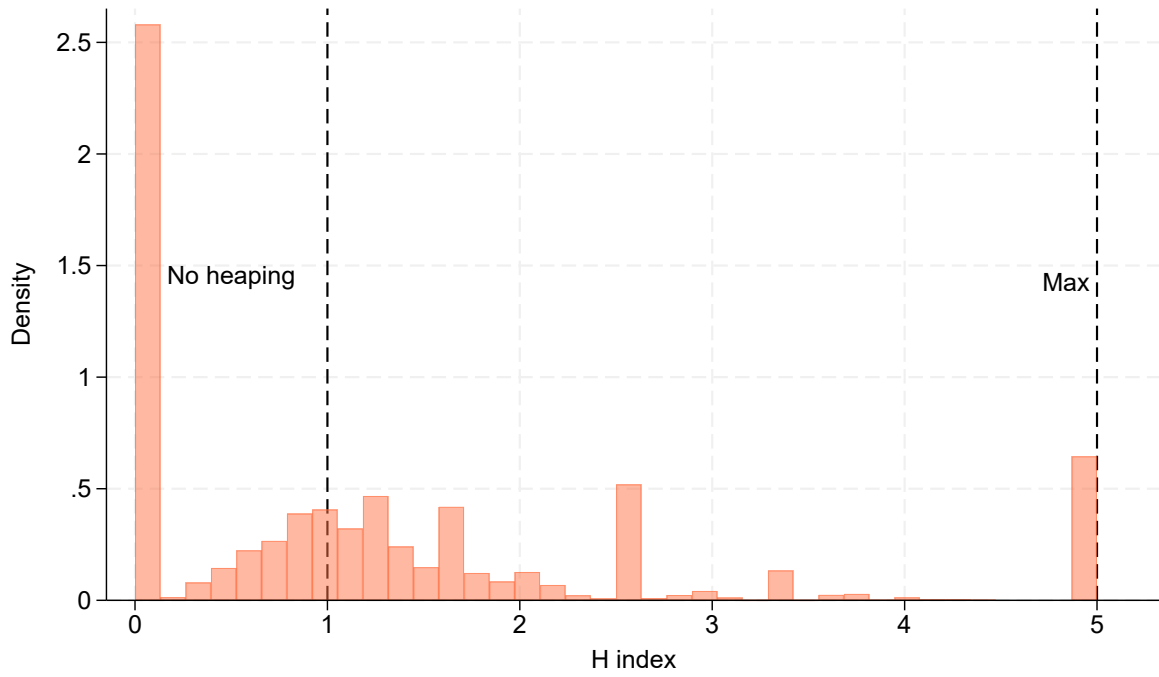


Figure A13: Heaping index distribution

Notes: This figure plots the distribution of our birth-year heaping index (H -index) for 7,069 judicial district-by-decade observations. For each judicial district and decade, the H -index is $\frac{1}{\rho} \left(\frac{N_0 + N_5}{\sum_{i=0}^9 N_i} \right)$, where N_i is the number of observations with birth year ending in i and ρ is the share of years ending in 0 or 5 in a decade (0.2). An H -index between 0 and 1 indicates no heaping, whereas values between 1 and 5 indicate heaping. The sample to construct the H -index is 79,590 women born in 1500–1750 in France and Belgium in rural custom areas or in towns with an urban custom, whose Geni record can be geo-located, and who died after 40.

Table A11: Fact 1: inheritance and the EMP in rural areas, robustness to birth-year heaping.

	All		Rare names		H-sample		Off-main line	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Panel A. Dep. variable = 1 if celibate</i>								
Egalitarian inheritance	−0.026*** (0.004)	−0.026*** (0.004)	−0.016*** (0.005)	−0.016*** (0.005)	−0.019** (0.009)	−0.019** (0.009)	−0.057*** (0.010)	−0.057*** (0.010)
Mean dep. variable	0.10	0.10	0.08	0.08	0.22	0.22	0.23	0.23
Effect size (β/mean)	−0.26	−0.26	−0.21	−0.21	−0.09	−0.09	−0.25	−0.25
N	70,728	70,728	37,312	37,312	31,925	31,925	26,284	26,284
<i>Panel B. Dep. Variable is age at first marriage</i>								
Egalitarian inheritance	−0.184*** (0.071)	−0.184*** (0.071)	−0.245** (0.095)	−0.243** (0.095)	−0.107 (0.104)	−0.109 (0.104)	−0.227* (0.118)	−0.227* (0.118)
Mean dep. variable	23.83	23.83	23.82	23.82	23.90	23.90	24.34	24.34
Effect size (β/mean)	−0.01	−0.01	−0.01	−0.01	0.00	0.00	−0.01	−0.01
N	58,794	58,794	30,530	30,530	27,011	27,011	20,764	20,764
Decade FE	Y	Y	Y	Y	Y	Y	Y	Y
Birth region FE	Y	Y	Y	Y	Y	Y	Y	Y
Heaping index	Y	Y	Y	Y	Y	Y	Y	Y
1(Birth year ends in 0 or 5)	.	Y	.	Y	.	Y	.	Y

Notes: This table presents estimates of Equation (1), augmented with a heaping index by judicial district and decade (odd columns), as well as an indicator for birth years ending in 0 or 5 (even columns). These additional covariates control for possible biases arising from birth-year heaping—a proxy for (lack of) data quality. The heaping index is, for each judicial district and decade, equal to $\frac{1}{\rho} \left(\frac{N_0 + N_5}{\sum_{i=0}^9 N_i} \right)$, where N_i is the number of observations with birth year ending in i and ρ is the share of years ending in 0 or 5 in a decade (0.2). The sample is women born in 1500–1750 in rural custom regions, whose Geni record can be geo-located, and who died after age 40. Panel A examines definite celibacy. Panel B examines age at first marriage among women who married during reproductive age (15 to 35). Quality filters in columns (3)–(8) are defined in Section 3.2. Rural custom regions are > 1 km from the centroid of an urban custom settlement. Birth region fixed effects comprise *Généralité* for France, and provinces, independent counties, and duchies for Belgium (see Appendix Figure C2). Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table A12: Fact 2: urban inheritance customs and the EMP, robustness to birth-year heaping.

	All		Rare names		H-sample		Off-main line	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Panel A. Dep. variable = 1 if celibate</i>								
Urban custom is egalitarian	0.048*** (0.014)	0.048*** (0.014)	0.035** (0.017)	0.035** (0.017)	0.079*** (0.026)	0.080*** (0.026)	0.062** (0.025)	0.061** (0.025)
Mean dep. variable	0.09	0.09	0.07	0.07	0.19	0.19	0.17	0.17
Effect size (β/mean)	0.52	0.52	0.53	0.53	0.42	0.42	0.36	0.36
N	4,844	4,844	2,843	2,843	2,339	2,339	2,164	2,164
<i>Panel B. Dep. Variable is age at first marriage</i>								
Urban custom is egalitarian	0.089 (0.228)	0.088 (0.228)	−0.194 (0.307)	−0.191 (0.308)	0.461 (0.325)	0.470 (0.324)	0.086 (0.346)	0.076 (0.345)
Mean dep. variable	24.78	24.78	24.69	24.69	24.74	24.74	25.22	25.22
Effect size (β/mean)	0.00	0.00	−0.01	−0.01	0.02	0.02	0.00	0.00
N	3,915	3,915	2,233	2,233	1,926	1,926	1,718	1,718
Decade FE	Y	Y	Y	Y	Y	Y	Y	Y
Birth region FE	Y	Y	Y	Y	Y	Y	Y	Y
Heaping index	Y	Y	Y	Y	Y	Y	Y	Y
1(Birth year ends in 0 or 5)	.	Y	.	Y	.	Y	.	Y

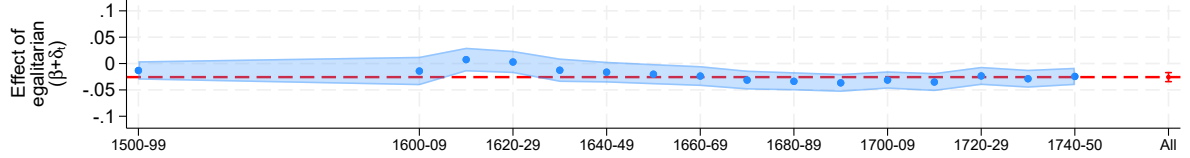
Notes: This table presents estimates of Equation (1), augmented with a heaping index by judicial district and decade (odd columns), as well as an indicator for birth years ending in 0 or 5 (even columns). These additional covariates control for possible biases arising from birth-year heaping—a proxy for (lack of) data quality. The heaping index is, for each judicial district and decade, equal to $\frac{1}{\rho} \left(\frac{N_0 + N_5}{\sum_{i=0}^9 N_i} \right)$, where N_i is the number of observations with birth year ending in i and ρ is the share of years ending in 0 or 5 in a decade (0.2). The sample is women born in 1500–1750 in towns with an urban custom, whose Geni record can be geo-located, and who died after age 40. Panel A examines definite celibacy. Panel B examines age at first marriage among women who married during reproductive age (15 to 35). Quality filters in columns (3)–(8) are defined in Section 3.2. Towns with an urban custom are all locations within 1km of urban custom centroid with a population over 5,000 (Buringh 2021). Birth region fixed effects comprise *Généralité* for France, and provinces, independent counties, and duchies for Belgium (see Appendix Figure C2). Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table A13: Fact 3: women's labor-market opportunities and the EMP, robustness to birth-year heaping.

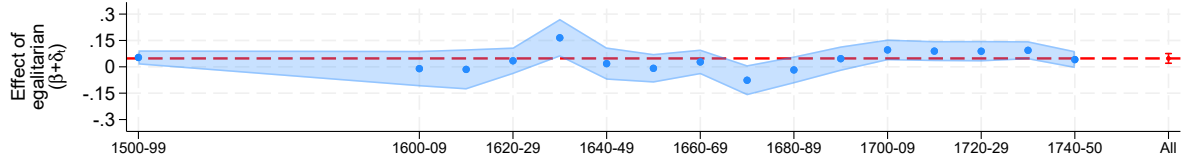
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	<i>Dep. Variable = 1 if celibate</i>				<i>Dep. Variable: age at first marriage</i>			
	All	Rare names	H-sample	Off main line	All	Rare names	H-sample	Off main line
<i>A. Inegalitarian inheritance</i>								
Pasture suitability	−0.107*** (0.018)	−0.108*** (0.022)	−0.177*** (0.036)	−0.244*** (0.041)	0.479* (0.286)	0.570 (0.383)	0.295 (0.442)	0.258 (0.509)
<i>B. Egalitarian inheritance</i>								
Pasture suitability	0.056** (0.023)	0.058** (0.028)	0.001 (0.047)	0.162*** (0.051)	1.450*** (0.373)	1.567*** (0.522)	1.751*** (0.565)	1.356** (0.639)
<i>p</i> -val. ineg.= egal.	0.000***	0.000***	0.003***	0.000***	0.039**	0.123	0.042**	0.179
Decade FE	Y	Y	Y	Y	Y	Y	Y	Y
Birth region FE	Y	Y	Y	Y	Y	Y	Y	Y
Heaping index	Y	Y	Y	Y	Y	Y	Y	Y
1(Birth year ends in 0 or 5)	Y	Y	Y	Y	Y	Y	Y	Y
Mean dep. variable	0.10	0.08	0.22	0.23	23.83	23.83	23.9	24.34
N	70,717	37,306	31,922	26,280	58,777	30,520	27,007	20,753

Notes: This table presents estimates of Equation (4), augmented with a heaping index by judicial district and decade, and with an indicator for birth years ending in 0 or 5. These additional covariates control for possible biases arising from birth-year heaping—a proxy for (lack of) data quality. The heaping index is, for each judicial district and decade, equal to $\frac{1}{\rho} \left(\frac{N_0 + N_5}{\sum_{i=0}^9 N_i} \right)$, where N_i is the number of observations with birth year ending in i and ρ is the share of years ending in 0 or 5 in a decade (0.2). The sample is women born in 1500–1750 in rural custom regions, whose Geni record can be geo-located, who died after age 40, and whose birthplace is covered by the data on pasture suitability. Columns 1–4 examine definite celibacy. Columns 5–8 examine age at first marriage among women who married during reproductive age (15 to 35). Quality filters in columns (2)–(4) and (6)–(8) are defined in Section 3.2. Rural custom regions are > 1 km from the centroid of an urban custom settlement. Birth region fixed effects comprise *Généralité* for France, and provinces, independent counties, and duchies for Belgium (see Appendix Figure C2). Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Panel (a) Rural customs (Fact 1)



Panel (b) Urban customs (Fact 2)



Panel (c) Women's opportunities (Fact 3)

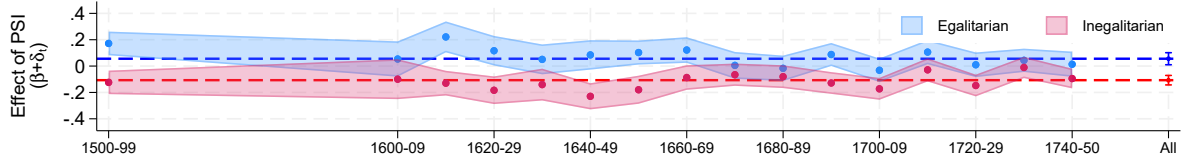


Figure A14: Fact 4: time effects of egalitarian inheritance and women's labor-market opportunities on celibacy, robustness to birth-year heaping.

Notes: This figure displays estimates from Equations (5) and (6), augmented with a heaping index by judicial district and decade, and with an indicator for birth years ending in 0 or 5. These additional covariates control for possible biases arising from birth-year heaping—a proxy for (lack of) data quality.

The heaping index is, for each judicial district and decade, equal to $\frac{1}{\rho} \left(\frac{N_0 + N_5}{\sum_{i=0}^9 N_i} \right)$, where N_i is the number of observations with birth year ending in i and ρ is the share of years ending in 0 or 5 in a decade (0.2). The dependent variable is celibacy. The sample is women born in 1500–1750 in Belgium and France, whose Geni record can be geo-located, and who died after 40. Panels (a) and (c) consider 70,728 women in rural custom regions—70,717 with data on pasture suitability; Panel (b) 4,844 women born in towns with an urban custom (see Tables 2 and 4 for details). Points represent estimates for $\beta + \delta_k$, the decade-specific effect of egalitarian inheritance (Panels (a) and (b)) and of pasture suitability (Panel (c)) on celibacy. Shaded areas are 95% confidence intervals. Horizontal dashed lines report baseline estimates from pooling all cohorts (also augmented with the heaping controls). All birth decades between 1500 and 1599 are grouped.

Table A14: Fact 1: Inheritance and celibacy in rural areas, unconditional fixed-effect logit estimates.

	(1)	(2)	(3)	(4)
	<i>Dep. variable = 1 if celibate</i>			
	All	Rare names	H-sample	Off main line
Egalitarian inheritance	−0.281*** (0.048)	−0.220*** (0.073)	−0.115** (0.054)	−0.343*** (0.058)
Decade dummies	Y	Y	Y	Y
Birth region dummies	Y	Y	Y	Y
Mean dep. variable	0.099	0.075	0.215	0.226
Marginal effect	−0.025	−0.015	−0.019	−0.058
N	70,685	37,253	31,894	26,273

Notes: This table presents unconditional fixed-effect logit estimates for Fact 1. Specifically, it reports β coefficients and marginal effects from:

$$Pr[Y_{i,j,t,r} = 1 | \mathbf{X}_{j,t,r}] = \frac{\exp(\alpha + \beta \mathbf{1}[\text{Egalitarian}_j] + \mu_t + \mu_r)}{1 + \exp(\alpha + \beta \mathbf{1}[\text{Egalitarian}_j] + \mu_t + \mu_r)}$$

where $Y_{i,j,t,r}$ is an indicator equal to one if a woman remained celibate throughout her life. The set of covariates $\mathbf{X}_{j,t,r}$ includes an indicator for judicial districts where inheritance was shared across offspring, including women ($\mathbf{1}[\text{Egalitarian}_j]$) and fixed effects for birth decades (μ_t) and regions (μ_r). We report unconditional fixed-effect logit estimates that fit this model by using a full maximum-likelihood approach. In practice, we use Stata's `logit` command with dummies for birth decades and regions. Although the maximum likelihood estimates of β in this unconditional fixed-effect logit model suffer from the incidental parameters bias, this bias is small as the average panel group (region) has 1,571 observations (women), and all but one group has more than 30 observations. The sample is women born in rural custom regions in 1500-1750, whose Geni record can be geo-located, and who died after 40. Quality filters in columns (2)–(4) are defined in Section 3.2. Rural custom regions are > 1 km from the centroid of an urban custom settlement. Birth region fixed effects comprise *Généralité* for France, and provinces, independent counties, and duchies for Belgium (see Appendix Figure C2). Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A15: Fact 2: urban inheritance customs and the EMP, fixed-effect logit estimates.

	All (1)	Rare names (2)	H-sample (3)	Off main line (4)
<i>Panel A. Conditional fixed-effect logit estimates</i>				
Urban custom is egalitarian	0.563*** (0.160)	0.561** (0.241)	0.527*** (0.175)	0.458** (0.188)
Mean dep. variable	0.094	0.068	0.191	0.174
Marginal effect	0.004	0.009	0.003	0.003
N	4,764	2,783	2,314	2,147
Decade FE	Y	Y	Y	Y
Birth region FE	Y	Y	Y	Y
<i>Panel B. Unconditional fixed-effect logit estimates</i>				
Urban custom is egalitarian	0.564*** (0.160)	0.563** (0.253)	0.529*** (0.173)	0.460** (0.184)
Mean dep. variable	0.096	0.073	0.196	0.178
Marginal effect	0.047	0.037	0.077	0.060
N	4,633	2,601	2,255	2,092
Decade dummies	Y	Y	Y	Y
Birth region dummies	Y	Y	Y	Y

Notes: This table presents fixed-effect logit estimates for Fact 2. Specifically, it reports β coefficients and marginal effects from:

$$Pr[Y_{i,j,t,r} = 1 | \mathbf{X}_{j,t,r}] = \frac{\exp(\alpha + \beta \mathbf{1}[\text{Egalitarian}_j] + \mu_t + \mu_r)}{1 + \exp(\alpha + \beta \mathbf{1}[\text{Egalitarian}_j] + \mu_t + \mu_r)}$$

where $Y_{i,j,t,r}$ is an indicator equal to one if a woman remained celibate throughout her life. The set of covariates $\mathbf{X}_{j,t,r}$ includes an indicator for towns with an urban custom specifying that inheritance was shared across offspring, including women ($\mathbf{1}[\text{Egalitarian}_j]$) and fixed effects for birth decades (μ_t) and regions (μ_r). In Panel A, we report conditional fixed-effect logit estimates where the likelihood contribution is calculated by conditioning on the number of positive outcomes (celibate women) within each group (region), rather than estimating the fixed effects directly. Formally, we estimate the probability of $Y_{i,j,t,r} = (y_{i,j,1,r}, \dots, y_{i,j,T_j,r})$ conditional on $\sum_{k=1}^{T_j} \sum_j y_{i,j,k,r}$. In practice, we use Stata's `xtlogit` command. In Panel B, we report unconditional fixed-effect logit estimates that fit this model by using a full maximum-likelihood approach—which is subject to the incidental parameters bias if the number of observations per panel group is small. In practice, we use Stata's `logit` command with dummies for birth decades and regions. The sample is women born in towns with an urban custom in 1500–1750 whose Geni record can be geo-located, whose Geni record can be geo-located, and who died after 40. Quality filters in columns (2)–(4) are defined in Section 3.2. Towns with an urban custom are all locations within 1km of urban custom centroid with a population over 5,000 (Buringh 2021). Birth region fixed effects comprise *Généralité* for France, and provinces, independent counties, and duchies for Belgium (see Appendix Figure C2). Panel A reports standard errors from Maximum Likelihood Estimation (MLE) computed from the observed information matrix (OIM) in parentheses; Panel B reports robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A16: Fact 3: Women’s labor-market opportunities and male celibacy, unconditional fixed-effect logit estimates.

	(1)	(2)	(3)	(4)
	<i>Dep. variable = 1 if celibate</i>			
	All	Rare names	H-sample	Off main line
<i>A. Inegalitarian inheritance</i>				
Pasture suitability	−1.142*** (0.187)	−1.465*** (0.283)	−1.039*** (0.209)	−1.359*** (0.227)
<i>B. Egalitarian inheritance</i>				
Pasture suitability	0.586** (0.251)	0.779** (0.390)	0.003 (0.276)	0.945*** (0.299)
<i>p</i> -value inegal. = egal.	0.000***	0.000***	0.003***	0.000***
Decade dummies	Y	Y	Y	Y
Birth region dummies	Y	Y	Y	Y
Mean dep. variable	0.10	0.08	0.22	0.23
N	70,600	37,100	31,871	26,231

Notes: This table presents unconditional fixed-effects logit estimates for Fact 3. Specifically, it reports log-odds coefficients from:

$$Pr[Y_{i,j,t,r} = 1 | \mathbf{X}_{j,t,r}] = \frac{\exp\left(\sum_{k \in \{0,1\}} \mathbf{1}[\text{Egalitarian}_j = k] \times \{\gamma_k \text{WEO}_j + \mu_{k,t} + \mu_{k,r}\}\right)}{1 + \exp\left(\sum_{k \in \{0,1\}} \mathbf{1}[\text{Egalitarian}_j = k] \times \{\gamma_k \text{WEO}_j + \mu_{k,t} + \mu_{k,r}\}\right)}$$

where $Y_{i,j,t,r}$ is an indicator equal to one if a woman remained celibate throughout her life. The set of covariates $\mathbf{X}_{j,t,r}$ includes our proxy for women’s labor-market opportunities (WEO_j)—the pasture suitability index in district j —and fixed effects for birth decades (μ_t) and regions (μ_r). Covariates are fully interacted with indicators for egalitarian ($\mathbf{1}[\text{Egalitarian}_j = 1]$) and inegalitarian inheritance ($\mathbf{1}[\text{Egalitarian}_j = 0]$), yielding separate estimates of the association between pasture suitability and the log odds of celibacy under egalitarian (γ_1) and inegalitarian (γ_0) inheritance, respectively. We fit this model by using a full maximum-likelihood approach—i.e., we use Stata’s `logit` command with dummies for birth decades and regions. Although the maximum likelihood estimates of γ_k in this unconditional fixed-effects logit model are subject to incidental-parameters bias, this bias is likely to be limited because the average panel group (region-by-inheritance-regime cell) contains 1,403 observations in egalitarian areas and 971 observations in inegalitarian areas, and all but one such cell contain more than 20 observations. The sample is women born in rural custom regions in 1500-1750, whose Geni record can be geo-located, who died after 40, and whose birthplace is covered by the data on pasture suitability. Quality filters in columns (2)–(4) are defined in Section 3.2. Rural custom regions are > 1 km from the centroid of an urban custom settlement. Birth region fixed effects comprise *Généralité* for France, and provinces, independent counties, and duchies for Belgium (see Appendix Figure C2). Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A17: Fact 1 robustness to rural-urban definition cut-off, fixed-effects estimates.

	<i>Dep. var. = 1 if celibate</i>				<i>Dep. var.: age at first marriage</i>			
	All (1)	Rare names (2)	H-sample (3)	Off main line (4)	All (5)	Rare names (6)	H-sample (7)	Off main line (8)
<i>Panel A. Rural if > 1 km from urban custom centroid (baseline)</i>								
Rural custom is egalitarian	−0.026*** (0.004)	−0.016*** (0.005)	−0.019** (0.009)	−0.057*** (0.010)	−0.189*** (0.070)	−0.243** (0.095)	−0.125 (0.103)	−0.250** (0.116)
N	70,728	37,312	31,925	26,284	58,794	30,530	27,011	20,764
<i>Panel B. Rural if > 2 km from urban custom centroid</i>								
Rural custom is egalitarian	−0.028*** (0.005)	−0.018*** (0.005)	−0.022** (0.009)	−0.062*** (0.010)	−0.199*** (0.072)	−0.268*** (0.098)	−0.170 (0.106)	−0.274** (0.119)
N	68,479	36,059	30,828	25,361	57,199	29,628	26,268	20,174
<i>Panel C. Rural if > 3 km from urban custom centroid</i>								
Rural custom is egalitarian	−0.028*** (0.005)	−0.017*** (0.005)	−0.019** (0.010)	−0.063*** (0.010)	−0.212*** (0.075)	−0.267*** (0.101)	−0.196* (0.110)	−0.347*** (0.124)
N	66,504	34,928	29,914	24,543	55,691	28,803	25,569	19,603
<i>Panel D. Rural if > 4 km from urban custom centroid</i>								
Rural custom is egalitarian	−0.030*** (0.005)	−0.018*** (0.006)	−0.021** (0.010)	−0.071*** (0.011)	−0.172** (0.077)	−0.235** (0.105)	−0.152 (0.112)	−0.318** (0.128)
N	64,021	33,470	28,811	23,495	53,944	27,755	24,811	18,942
<i>Panel E. Rural if > 5 km from urban custom centroid</i>								
Rural custom is egalitarian	−0.034*** (0.005)	−0.022*** (0.006)	−0.027*** (0.010)	−0.079*** (0.011)	−0.153* (0.079)	−0.197* (0.108)	−0.124 (0.114)	−0.304** (0.130)
N	61,248	31,967	27,512	22,434	52,035	26,702	23,982	18,313
Decade FE	Y	Y	Y	Y	Y	Y	Y	Y
Birth region FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table presents estimates from Equation (1) on the relationship between egalitarian inheritance and the EMP in rural areas, using five cutoffs to define rural custom regions: > 1 km (Panel A), > 2 km (Panel B), > 3 km (Panel C), > 4 km (Panel D), and > 5 km (Panel E) from the centroid of a settlement with an urban custom. The sample is women born in rural custom regions in 1500–1750, whose Geni record can be geo-located, and who died after age 40. Columns (1)–(4) examines definite celibacy. Columns (5)–(8) examines age at first marriage among women who married during reproductive age (15 to 35). Quality filters in columns (2)–(4) and (6)–(8) are defined in Section 3.2. Birth region fixed effects comprise *Généralité* for France, and provinces, independent counties, and duchies for Belgium (see Appendix Figure C2). Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table A18: Fact 2 robustness to rural-urban definition cut-off, fixed-effects estimates.

	<i>Dep. var. = 1 if celibate</i>				<i>Dep. var.: age at first marriage</i>			
	All (1)	Rare names (2)	H-sample (3)	Off main line (4)	All (5)	Rare names (6)	H-sample (7)	Off main line (8)
<i>Panel A. Urban if < 1 km from urban custom centroid (baseline)</i>								
Urban custom is egalitarian	0.049*** (0.014)	0.036** (0.016)	0.080*** (0.026)	0.062** (0.025)	0.080 (0.227)	-0.197 (0.306)	0.457 (0.325)	0.080 (0.346)
N	4,844	2,843	2,339	2,164	3,915	2,233	1,926	1,718
<i>Panel B. Urban if < 2 km from urban custom centroid</i>								
Urban custom is egalitarian	0.048*** (0.012)	0.035** (0.014)	0.074*** (0.023)	0.076*** (0.022)	0.195 (0.196)	0.060 (0.266)	0.422 (0.284)	0.212 (0.316)
N	5,931	3,433	2,902	2,610	4,704	2,683	2,316	2,001
<i>Panel C. Urban if < 3 km from urban custom centroid</i>								
Urban custom is egalitarian	0.032*** (0.011)	0.020 (0.013)	0.059*** (0.020)	0.048** (0.020)	0.070 (0.172)	-0.080 (0.237)	0.247 (0.251)	0.193 (0.279)
N	6,709	3,902	3,278	2,938	5,231	2,988	2,560	2,196
<i>Panel D. Urban if < 4 km from urban custom centroid</i>								
Urban custom is egalitarian	0.031*** (0.010)	0.018 (0.011)	0.058*** (0.018)	0.046** (0.019)	-0.036 (0.156)	0.005 (0.210)	0.065 (0.228)	0.084 (0.256)
N	7,858	4,579	3,871	3,436	6,054	3,464	2,980	2,514
<i>Panel E. Urban if < 5 km from urban custom centroid</i>								
Urban custom is egalitarian	0.021** (0.009)	0.013 (0.011)	0.036** (0.017)	0.032* (0.018)	-0.026 (0.141)	0.038 (0.187)	-0.059 (0.209)	0.033 (0.236)
N	8,903	5,194	4,361	3,827	6,811	3,916	3,294	2,739
Decade FE	Y	Y	Y	Y	Y	Y	Y	Y
Birth region FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table presents estimates from Equation (1) on the relationship between egalitarian inheritance and the EMP in urban areas, using five different cutoffs to define towns with an urban custom: all locations with a population over 5,000 (Buringh 2021) within 1 km (Panel A), 2 km (Panel B), 3 km (Panel C), 4 km (Panel D), and 5 km (Panel E) of an urban custom centroid. The sample is women born in a town with an urban custom in 1500–1750, whose Geni record can be geo-located, and who died after age 40. Columns (1)–(4) examines definite celibacy. Columns (5)–(8) examines age at first marriage among women who married during reproductive age (15 to 35). Quality filters in columns (2)–(4) and (6)–(8) are defined in Section 3.2. Birth region fixed effects comprise *Généralité* for France, and provinces, independent counties, and duchies for Belgium (see Appendix Figure C2). Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table A19: Fact 3 robustness to rural-urban definition cut-off, fixed-effects estimates.

	<i>Dep. var. = 1 if celibate</i>				<i>Dep. var.: age at first marriage</i>			
	All (1)	Rare names (2)	H-sample (3)	Off main line (4)	All (5)	Rare names (6)	H-sample (7)	Off main line (8)
<i>Panel A. Rural if > 1 km from urban custom centroid (baseline)</i>								
Pasture suitability (inegalitarian)	−0.107*** (0.018)	−0.108*** (0.022)	−0.178*** (0.036)	−0.244*** (0.041)	0.480* (0.286)	0.573 (0.383)	0.295 (0.442)	0.260 (0.509)
Pasture suitability (egalitarian)	0.055** (0.023)	0.057** (0.028)	0.001 (0.047)	0.161*** (0.051)	1.447*** (0.372)	1.568*** (0.521)	1.723*** (0.565)	1.307** (0.638)
<i>p</i> -value difference	0.000***	0.000***	0.003***	0.000***	0.039**	0.124	0.046**	0.200
N	70,717	37,306	31,922	26,280	58,777	30,520	27,007	20,753
<i>Panel B. Rural if > 2 km from urban custom centroid</i>								
Pasture suitability (inegalitarian)	−0.111*** (0.019)	−0.107*** (0.023)	−0.186*** (0.037)	−0.247*** (0.042)	0.531* (0.290)	0.649* (0.388)	0.277 (0.449)	0.312 (0.516)
Pasture suitability (egalitarian)	0.042* (0.024)	0.051* (0.029)	−0.020 (0.049)	0.155*** (0.053)	1.557*** (0.382)	1.509*** (0.534)	1.837*** (0.579)	1.313** (0.657)
<i>p</i> -value difference	0.000***	0.000***	0.007***	0.000***	0.033**	0.193	0.033**	0.231
N	68,468	36,053	30,825	25,357	57,182	29,618	26,264	20,163
<i>Panel C. Rural if > 3 km from urban custom centroid</i>								
Pasture suitability (inegalitarian)	−0.109*** (0.019)	−0.107*** (0.023)	−0.185*** (0.038)	−0.240*** (0.042)	0.560* (0.294)	0.648* (0.393)	0.292 (0.455)	0.500 (0.524)
Pasture suitability (egalitarian)	0.058** (0.025)	0.058** (0.029)	0.009 (0.050)	0.177*** (0.054)	1.553*** (0.388)	1.527*** (0.541)	1.816*** (0.588)	1.213* (0.664)
<i>p</i> -value difference	0.000***	0.000***	0.002***	0.000***	0.041**	0.189	0.040**	0.399
N	66,493	34,922	29,911	24,539	55,674	28,793	25,565	19,592

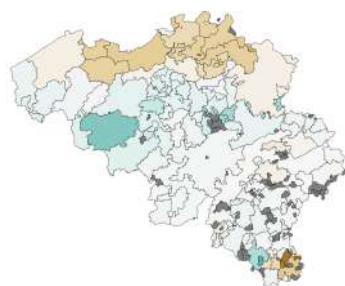
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Table A19: Fact 3 robustness to rural-urban definition cut-off, fixed-effects estimates (continued).

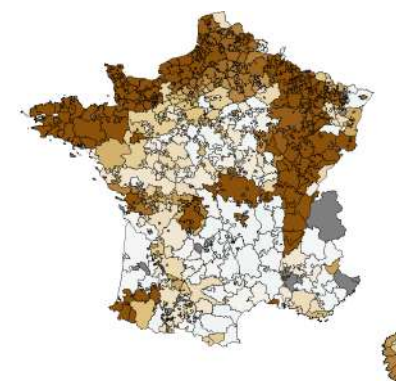
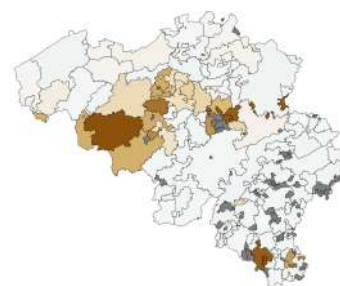
	<i>Dep. var. = 1 if celibate</i>				<i>Dep. var.: age at first marriage</i>			
	All (1)	Rare names (2)	H-sample (3)	Off main line (4)	All (5)	Rare names (6)	H-sample (7)	Off main line (8)
<i>Panel D. Rural if > 4 km from urban custom centroid</i>								
Pasture suitability (inegalitarian)	−0.118*** (0.019)	−0.116*** (0.023)	−0.207*** (0.038)	−0.253*** (0.043)	0.521* (0.297)	0.625 (0.397)	0.227 (0.458)	0.491 (0.529)
Pasture suitability (egalitarian)	0.056** (0.026)	0.049 (0.030)	0.011 (0.052)	0.179*** (0.056)	1.415*** (0.401)	1.381** (0.561)	1.618*** (0.611)	1.157* (0.692)
<i>p</i> -value difference	0.000***	0.000***	0.001***	0.000***	0.073*	0.272	0.069*	0.444
N	64,010	33,464	28,808	23,491	53,927	27,745	24,807	18,931
<i>Panel E. Rural if > 5 km from urban custom centroid</i>								
Pasture suitability (inegalitarian)	−0.122*** (0.019)	−0.120*** (0.024)	−0.212*** (0.038)	−0.261*** (0.043)	0.525* (0.300)	0.620 (0.402)	0.212 (0.463)	0.476 (0.532)
Pasture suitability (egalitarian)	0.048* (0.027)	0.039 (0.033)	0.002 (0.056)	0.185*** (0.060)	1.393*** (0.423)	1.445** (0.596)	1.373** (0.654)	0.816 (0.739)
<i>p</i> -value difference	0.000***	0.000***	0.002***	0.000***	.094	.251	.147	.708
N	61,237	31,961	27,509	22,430	52,018	26,692	23,978	18,302
Decade FE	Y	Y	Y	Y	Y	Y	Y	Y
Birth region FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table presents estimates from Equation (4) on the relationship between women's labor-market opportunities and the EMP across inheritance systems in rural areas, using five different cutoffs to define rural custom regions: > 1 km (Panel A), > 2 km (Panel B), > 3 km (Panel C), > 4 km (Panel D), and > 5 km (Panel E) from the centroid of an urban custom settlement. The sample is women born in rural custom regions in 1500–1750, whose Geni record can be geo-located, who died after age 40, and whose birthplace is covered by the data on pasture suitability. Columns (1)–(4) examines definite celibacy. Columns (5)–(8) examines age at first marriage among women who married during reproductive age (15 to 35). Quality filters in columns (2)–(4) and (6)–(8) are defined in Section 3.2. Birth region fixed effects comprise *Généralité* for France, and provinces, independent counties, and duchies for Belgium (see Appendix Figure C2). Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

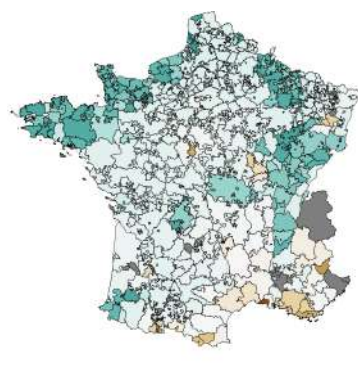
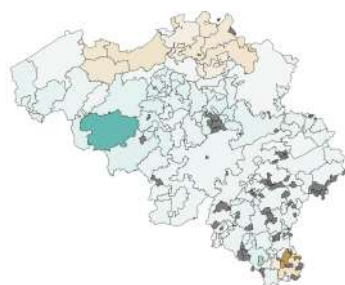
(a) Universal partible inheritance + universal women's rights



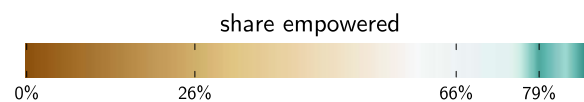
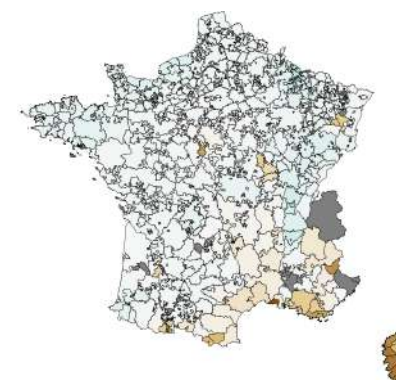
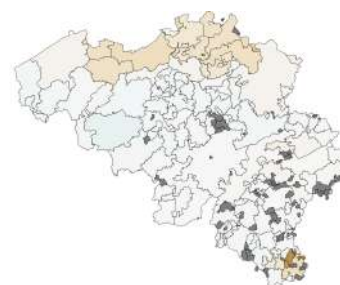
(b) Universal partible inheritance + no women's rights



(c) Universal impartible inheritance + universal women's rights



(d) Universal impartible inheritance + no women's rights



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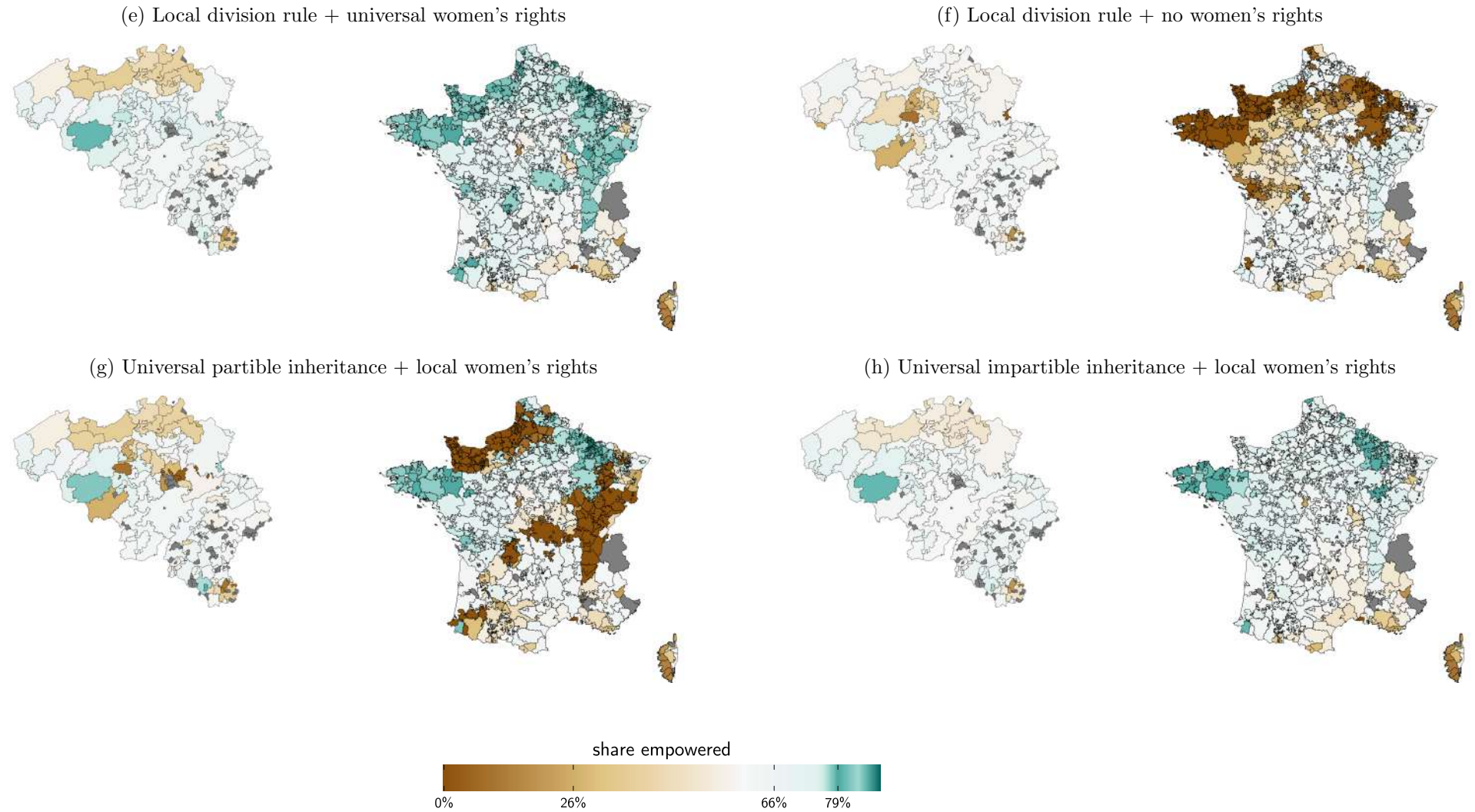
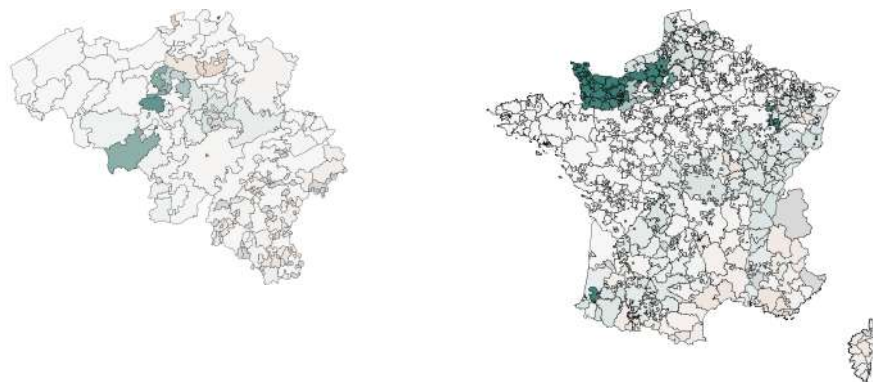


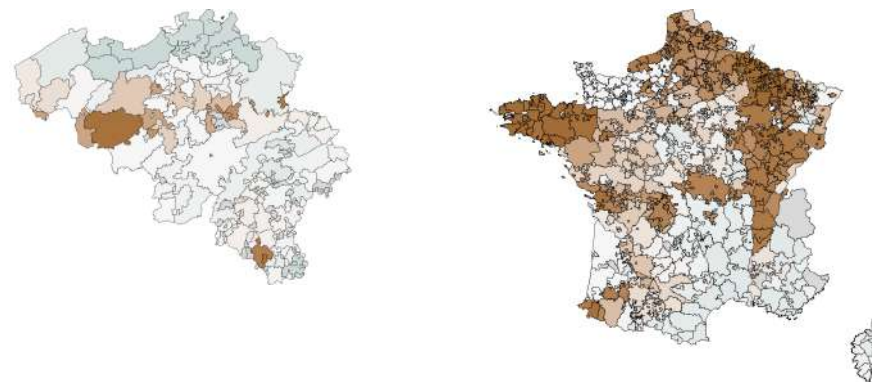
Figure A15: Share of empowered celibacy under eight counterfactual inheritance regimes across Belgium and France

Notes: The maps report the model-implied share of empowered celibacy in each judicial district and exclave, under eight counterfactual inheritance regimes. Counterfactuals (a)–(d) impose, to all districts, partible inheritance with women's inheritance rights, partible inheritance without women's inheritance rights, impartible inheritance with women's inheritance rights, and impartible inheritance without women's inheritance rights. Counterfactuals (e) and (f) preserve the local division rule while universally imposing women's inheritance rights and excluding women from inheritance, respectively. Counterfactuals (g) and (h) preserve the local women's inheritance rights while universally imposing partible and impartible inheritance, respectively. For comparability, all panels use the same color scale as in Figure 8.

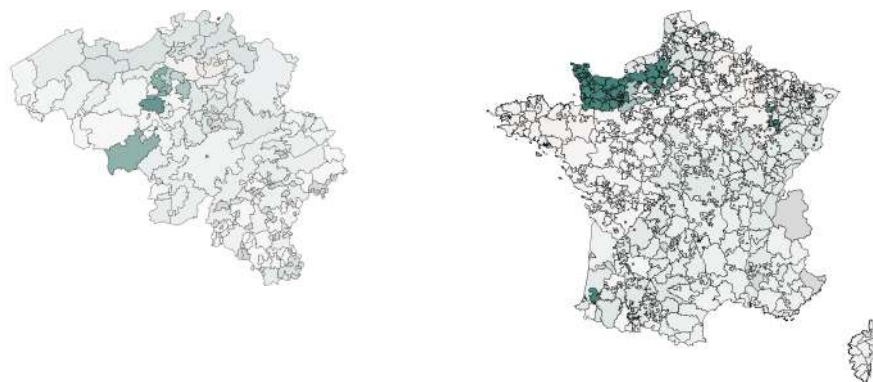
(a) Universal partible inheritance + universal women's rights



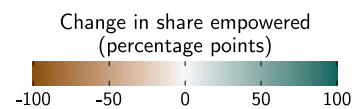
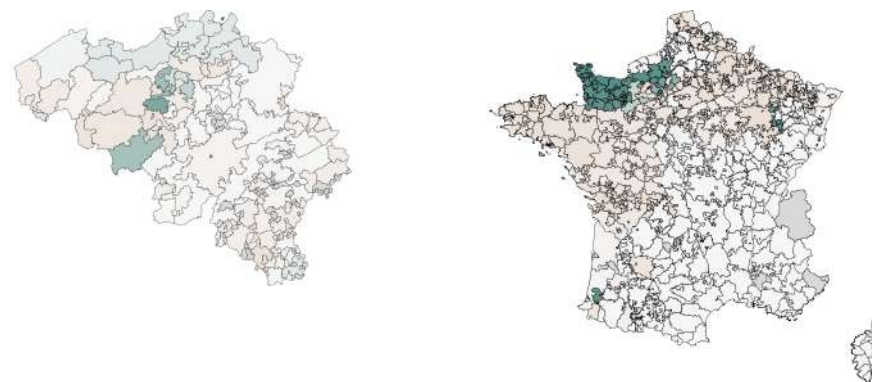
(b) Universal partible inheritance + no women's rights



(c) Universal impartible inheritance + universal women's rights



(d) Universal impartible inheritance + no women's rights



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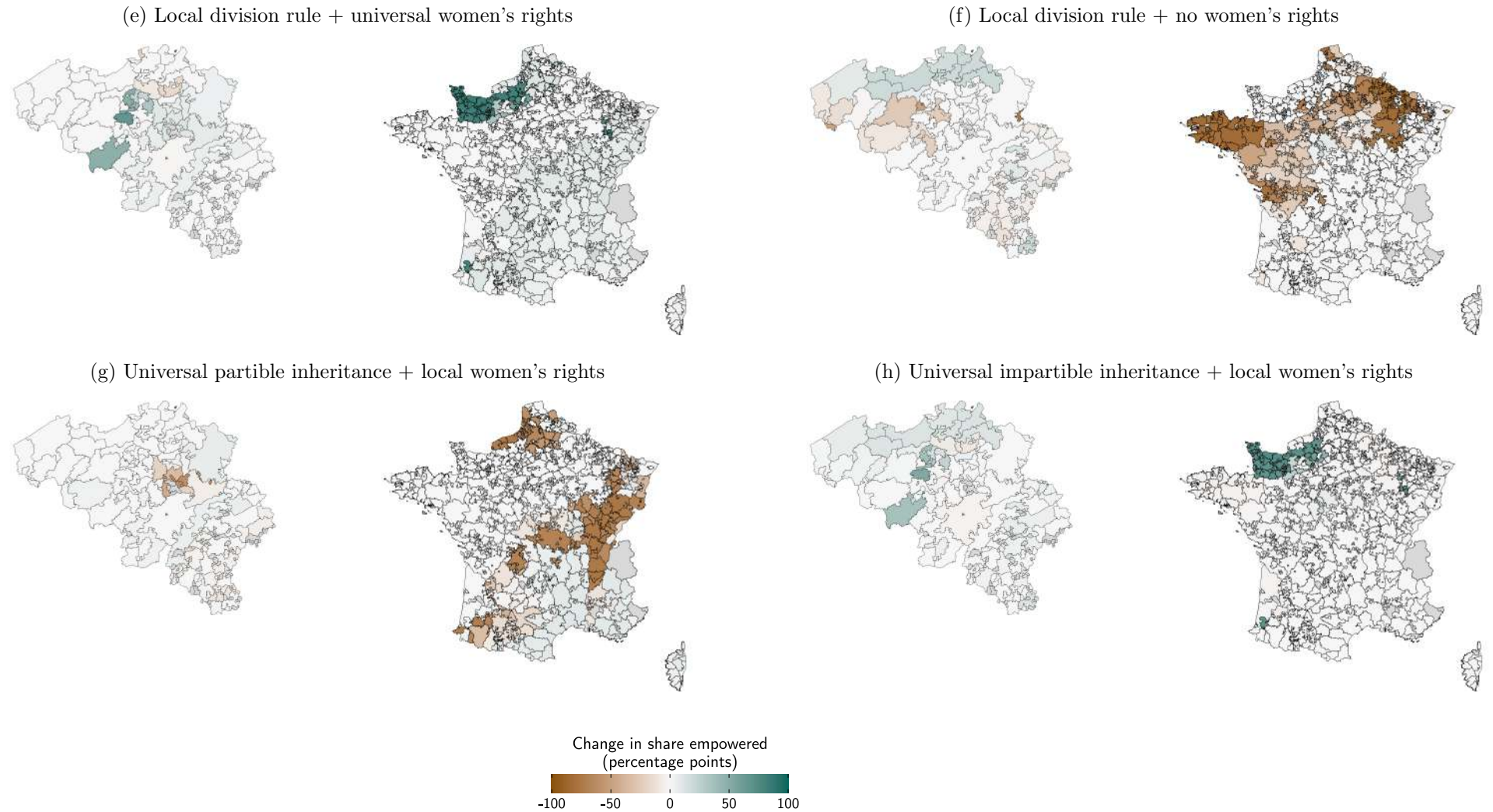


Figure A16: Change in empowered celibacy under eight counterfactual inheritance regimes across Belgium and France

Notes: The maps report, for each counterfactual scenario, the change in the share of empowered celibacy relative to that under the observed local inheritance customs. Positive values (in green) indicate an increase in the share of empowered women among celibate women, while negative values (in brown) indicate a decrease. Counterfactuals (a)–(d) impose, to all districts, partible inheritance with women's inheritance rights, partible inheritance without women's inheritance rights, impartible inheritance with women's inheritance rights, and impartible inheritance without women's inheritance rights. Counterfactuals (e) and (f) preserve the local division rule while universally imposing women's inheritance rights and excluding women from inheritance, respectively. Counterfactuals (g) and (h) preserve the local women's inheritance rights while universally imposing partible and impartible inheritance, respectively.

Appendix B. Theory appendix

B.1 Closed-form household decisions

Conditional on marital status, individuals choose private consumption and investment in the household good to maximize utility (Equations (7) and (8) for celibate individuals and couples), subject to the budget constraint (Equations (9) and (10)) and to the feasibility constraint that inheritance is required for independent household formation (Equations (11) and (12)).

For celibate individuals, the optimal choices on investment in the household good and consumption are, respectively:

$$Q_i^*(a_i, w_i) = \begin{cases} 0 & \text{if } a_i = 0 \\ 0 & \text{if } a_i = 1 \text{ and } w_i \leq \nu^h \rho \\ \frac{1}{2\rho}(w_i - \nu^h \rho), & \text{if } a_i = 1 \text{ and } w_i > \nu^h \rho. \end{cases} \quad (15)$$

$$c_i^*(a_i, w_i) = \begin{cases} w_i & \text{if } a_i = 0 \\ w_i & \text{if } a_i = 1 \text{ and } w_i \leq \nu^h \rho \\ \frac{1}{2}(w_i + \nu^h \rho) & \text{if } a_i = 1 \text{ and } w_i > \nu^h \rho. \end{cases} \quad (16)$$

For couples, the optimal choices on investment in the household good and consumption of wife and husband are, respectively:

$$Q^*(a_f, a_m, w_f, w_m) = \begin{cases} 0 & \text{if } a_f + a_m = 0 \\ 0 & \text{if } a_f + a_m > 0 \text{ and } w_f + w_m \leq \nu^h \rho \\ \frac{w_f + w_m - \nu^h \rho}{2\rho} & \text{if } a_f + a_m > 0 \text{ and } w_f + w_m > \nu^h \rho. \end{cases} \quad (17)$$

$$c_f^*(a_f, a_m, w_f, w_m) = \begin{cases} \theta(w_f + w_m) & \text{if } a_f + a_m = 0 \\ \theta(w_f + w_m) & \text{if } a_f + a_m > 0 \text{ and } w_f + w_m \leq \nu^h \rho \\ \frac{\theta}{2}(w_f + w_m + \nu^h \rho) & \text{if } a_f + a_m > 0 \text{ and } w_f + w_m > \nu^h \rho. \end{cases} \quad (18)$$

$$c_m^*(a_f, a_m, w_f, w_m) = \begin{cases} (1 - \theta)(w_f + w_m) & \text{if } a_f + a_m = 0 \\ (1 - \theta)(w_f + w_m) & \text{if } a_f + a_m > 0 \text{ and } w_f + w_m \leq \nu^h \rho \\ \frac{1 - \theta}{2}(w_f + w_m + \nu^h \rho) & \text{if } a_f + a_m > 0 \text{ and } w_f + w_m > \nu^h \rho. \end{cases} \quad (19)$$

B.2 Closed-form value functions

This section derives the closed-form expressions for the value functions defined in Section 5.3. These are obtained by substituting the optimal choices from Appendix B.1 into the utility functions.

For a celibate woman with income w_f and inheritance rights a_f , the closed-form expression for her value function is:

$$\mathcal{S}_f(a_f, w_f) = \begin{cases} \ln(\nu^h w_f) - s_f & \text{if } a_f = 0 \\ \ln(\nu^h w_f) - s_f & \text{if } a_f = 1 \text{ and } w_f \leq \nu^h \rho \\ \ln\left(\frac{(w_f + \rho\nu^h)^2}{4\rho}\right) - s_f & \text{if } a_f = 1 \text{ and } w_f > \nu^h \rho. \end{cases} \quad (20)$$

For a celibate man with income w_m and inheritance rights a_m , the closed-form expression for his value function is:

$$\mathcal{S}_m(a_m, w_m) = \begin{cases} \ln(\nu^h w_m) & \text{if } a_m = 0 \\ \ln(\nu^h w_m) & \text{if } a_m = 1 \text{ and } w_m \leq \nu^h \rho \\ \ln\left(\frac{(w_m + \rho\nu^h)^2}{4\rho}\right) & \text{if } a_m = 1 \text{ and } w_m > \nu^h \rho. \end{cases} \quad (21)$$

For a woman with income w_f and inheritance rights a_f , the value function of marrying a man with income w_m and inheritance rights a_m is:

$$\mathcal{M}_f(a_f, w_f, a_m, w_m) = \begin{cases} \ln(\theta\nu^h(w_f + w_m)) & \text{if } a_f + a_m = 0 \\ \ln(\theta\nu^h(w_f + w_m)) & \text{if } a_f + a_m > 0 \text{ and } w_f + w_m \leq \nu^h \rho \\ \ln\left(\frac{\theta(w_f + w_m + \rho\nu^h)^2}{4\rho}\right) & \text{if } a_f + a_m > 0 \text{ and } w_f + w_m > \nu^h \rho. \end{cases} \quad (22)$$

For a man with income w_m and inheritance rights a_m , the value function of marrying a woman with income w_f and inheritance rights a_f is:

$$\mathcal{M}_m(a_f, w_f, a_m, w_m) = \begin{cases} \ln((1 - \theta)\nu^h(w_f + w_m)) & \text{if } a_f + a_m = 0 \\ \ln((1 - \theta)\nu^h(w_f + w_m)) & \text{if } a_f + a_m > 0 \text{ and } w_f + w_m \leq \nu^h \rho \\ \ln\left(\frac{(1 - \theta)(w_f + w_m + \rho\nu^h)^2}{4\rho}\right) & \text{if } a_f + a_m > 0 \text{ and } w_f + w_m > \nu^h \rho. \end{cases} \quad (23)$$

These expressions highlight that value functions are piecewise, reflecting both the inheritance feasibility constraint and the income threshold required to invest in the household good.

B.3 Marriage market cases by inheritance status

This section characterizes the possible matches in the marriage market as a function of inheritance rights. Consider a match between a woman of type (a_f, w_f) and a man of type (a_m, w_m) . Marriage occurs if and only if:

$$\mathcal{M}_f(a_f, w_f, a_m, w_m) \geq \mathcal{S}_f(a_f, w_f) \quad \text{and} \quad \mathcal{M}_m(a_f, w_f, a_m, w_m) \geq \mathcal{S}_m(a_m, w_m). \quad (24)$$

Given the inheritance custom prevailing in each local marriage market, there are four possible matching scenarios:

Case 1: $a_f = a_m = 0$. When matched individuals lack inheritance rights, forming an independent household is not feasible ($Q = 0$) for either couples or celibate individuals. Marriage occurs if the woman prefers sharing her income to facing the stigma of celibacy, and her income is high enough for the man to prefer pooling resources, i.e., $1 - \theta > \frac{w_m}{(w_f + w_m)}$.

Case 2: $a_f = 1, a_m = 0$. When an heiress is matched with a non-heir, the woman can form an independent household when celibate if her income is sufficiently high, $w_f > \nu^h \rho$, whereas the man cannot unless the couple's pooled income satisfies $w_f + w_m > \nu^h \rho$. Marriage therefore provides the man with access to the household good, while for the woman the gains from marriage depend on the trade-off between sharing the maintenance cost of the public good Q and avoiding the stigma of being single versus the income loss from intra-household bargaining.

Case 3: $a_f = 0, a_m = 1$. This case is symmetric to Case 2, with the roles of men and women reversed.

Case 4: $a_f = a_m = 1$. When both individuals have inheritance rights, both women and men can form an independent household as celibate individuals if their individual incomes exceed the threshold $\nu^h \rho$. Marriage allows them to share the maintenance cost of the household good, increasing the gains from pooling resources.

Taken together, these cases illustrate how inheritance rights jointly determine the feasibility of independent household formation and the incentives to marry.

B.4 Identification of model’s parameters

This section describes in detail how the six estimated parameters of the model— θ , μ_ω , σ_ω , s_f , $\nu^{egalitarian}$, and $\nu^{inegalitarian}$ —are identified from the data.

Figure B1 shows how changes in the model’s parameters affect the relationship between the celibacy rates simulated by the model and our observed proxy for women’s income—pasture suitability. Solid lines use simulated celibacies under the benchmark parameter estimates in Table 8; dotted and dashed lines vary one parameter at a time. In detail, we increase each parameter by 20 percent while holding all remaining parameters at their benchmark values. For ν^e , we instead increase the parameter from 0.00 to 0.5, since a 20 percent increase relative to its benchmark value would generate only negligible changes. For visibility, each panel compares the benchmark with two parameter variations.

Each plotted relationship is obtained by regressing the simulated celibacy rate in each judicial district or exclave on pasture suitability and region fixed effects, weighting each judicial district or exclave by the number of women in the Geni sample. We estimate these relationships separately for inegalitarian inheritance areas (left panels) and egalitarian inheritance areas (right panels). Table B1 reports the corresponding intercepts and slopes, together with the intercept and slope for the pooled sample ($N = 992$), and three additional moments: the average celibacy rate, the average celibacy rate in egalitarian areas, and the average celibacy rate in inegalitarian areas. By showing how parameter changes affect the simulated celibacy–pasture suitability relationship, the figure illustrates how the targeted moments identify the parameters of the model. Below, we discuss the identification of each parameter in turn.

Parameters identified from the slopes. Parameters μ_ω , θ , and s_f are primarily identified by the slopes of the relationship between female celibacy and the pasture suitability proxy for women’s economic opportunities. Holding all other parameters constant, higher values of μ_ω , θ , or s_f make this relationship more negative, independently of the inheritance regime.

For θ , the economic intuition is straightforward. A higher θ implies that women have greater bargaining power within marriage. This reduces the attractiveness of celibacy, especially for high-income women, who now lose less from sharing resources with a spouse. As a result, female celibacy declines most strongly among women with better economic opportunities, making the relationship between celibacy and women’s economic opportunities more negative.

A higher s_f generates a similar pattern by reducing the attractiveness of remaining single, especially among women with better economic opportunities.

For μ_ω , the intuition is more subtle. Higher values imply higher male incomes, which have two opposing effects on marriage. On the one hand, marriage becomes more feasible because couples can more easily cover the maintenance cost ρ of the independent household good. On the other hand, richer men have less to gain from pooling resources through marriage and are therefore more likely to reject potential spouses—especially those with low incomes. In the estimated model, this latter force dominates. The main reason is that, both in the model and in the data, men earn higher incomes than women on average. As a result, increases in male income primarily raise the opportunity cost of marriage for men rather than relax the budgetary cost of maintaining an independent household. Since this opportunity-cost effect is strongest

among men matched with low-income women, the relationship between female celibacy and women’s economic opportunities becomes more negative.

Parameters identified from the intercepts. The variance of men’s income, σ_ω , is primarily identified by the overall level of celibacy. All else equal, a higher variance of men’s log income, σ_ω , implies higher celibacy rates. The reason is that greater income dispersion increases the mass of both very low-income and very high-income men, reducing the share of mutually beneficial matches. At the lower end of the distribution, men contribute little to household formation; at the upper end, they have weaker incentives to share resources through marriage. As a result, greater income dispersion raises celibacy rates across inheritance regimes. Because this mechanism operates through the distribution of male incomes rather than through inheritance institutions or women’s economic opportunities, it mainly affects the intercepts of the targeted moments rather than their slopes.

Parameters identified from differences across inheritance regimes. Higher values of ν increase the utility of co-residence in an extended household, making celibacy more attractive and weakening incentives to marry. Since $\nu^{\text{egalitarian}}$ and $\nu^{\text{inegalitarian}}$ are the only preference parameters allowed to differ across inheritance regimes, they are primarily identified by differences in the female celibacy–income relationship between the two regimes. Intuitively, increasing $\nu^{\text{egalitarian}}$ shifts the celibacy–income relationship in egalitarian areas while leaving the relationship in inegalitarian areas unchanged; the reverse holds for $\nu^{\text{inegalitarian}}$. The two parameters are therefore pinned down by the extent to which the level and slope of the relationship differ across inheritance systems.

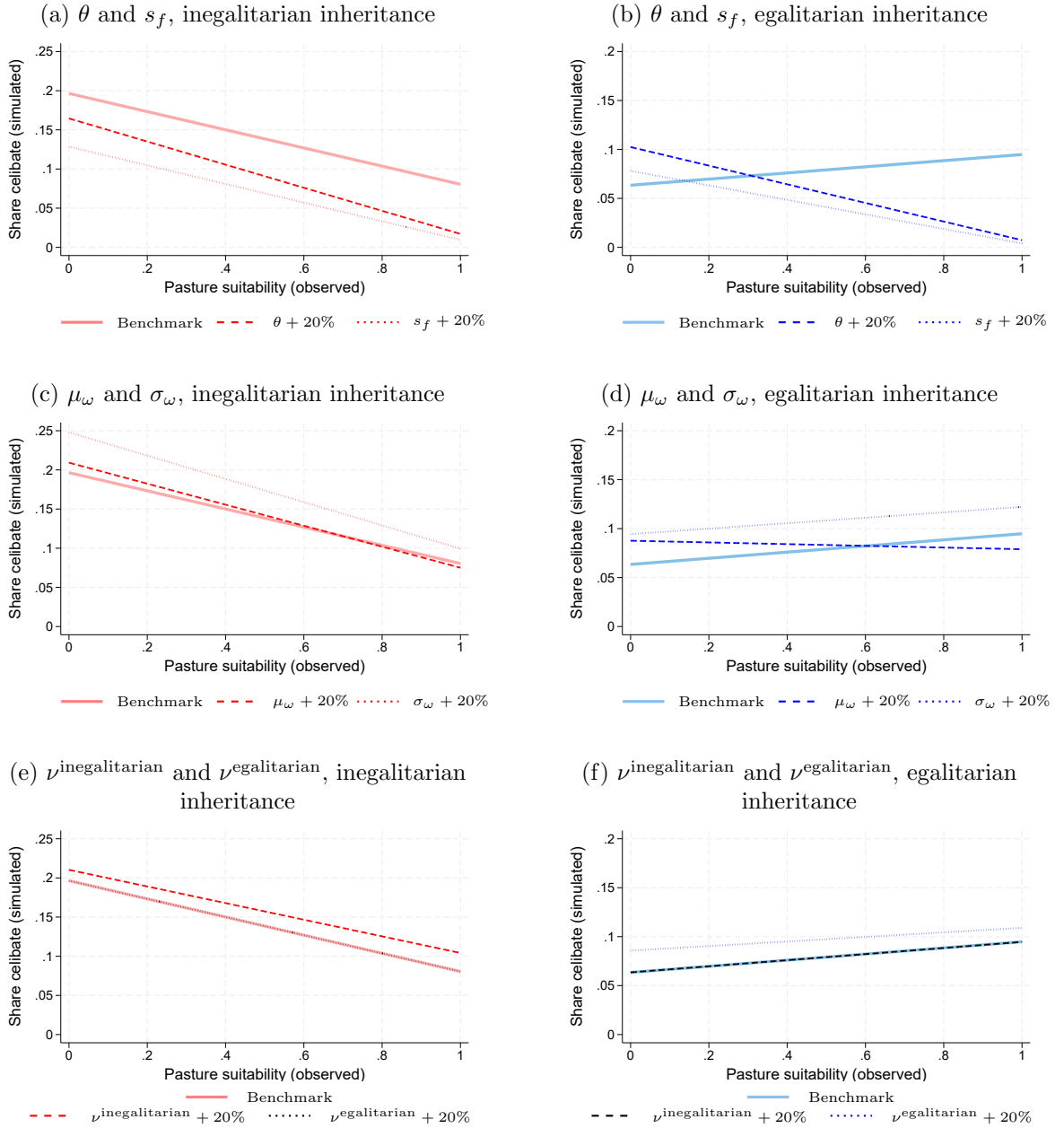


Figure B1: Sensitivity of the pasture suitability–simulated celibacy relationship to changes in model parameter values.

Notes: This figure shows the relationship between the celibacy rates simulated by the model under different parameter values and the observed pasture suitability index, by inheritance regime. For each scenario, we plot the coefficients of a regression of simulated celibacy in each judicial district and exclave on pasture suitability and region fixed effects, weighted by the number of women in each judicial district and exclave. Solid lines use the simulated celibacy under benchmark parameter estimates in Table 8; dotted and dashed lines use the simulated celibacy varying one model parameter at a time. Each panel compares the benchmark calibration with two alternative parameter values and illustrates how changes in the parameters affect the level and slope of the relationship between celibacy and pasture suitability.

Table B1: Simulated moments and celibacy aggregates under different model parameter values.

	Model Benchmark	$\theta = 0.203$ (+20%)	$s_f = 2.018$ (+20%)	$\nu^e = 0.5$ fixed	$\nu^i = 1.699$ (+20%)	$\mu_\omega = -0.796$ (+20%)	$\sigma_\omega = 2.744$ (+20%)
<i>Fact 1: Celibacy on egalitarian inheritance, FE</i>							
Intercept	0.113	0.054	0.040	0.113	0.136	0.111	0.141
Slope coefficient	-0.027	-0.015	-0.010	-0.010	-0.051	-0.028	-0.025
<i>Fact 3: Celibacy on pasture suitability, FE</i>							
Intercept, egalitarian areas	0.070	0.103	0.079	0.092	0.068	0.093	0.103
Slope coefficient, egalitarian areas	0.036	-0.083	-0.066	0.021	0.049	-0.000	0.030
Intercept, inegalitarian areas	0.168	0.143	0.113	0.180	0.166	0.179	0.218
Slope coefficient, inegalitarian areas	-0.090	-0.131	-0.107	-0.098	-0.070	-0.108	-0.121
<i>Celibacy aggregates (non-targeted)</i>							
Average celibacy rate	0.099	0.046	0.034	0.108	0.108	0.096	0.127
Average celibacy rate, egalitarian areas	0.086	0.035	0.026	0.102	0.086	0.081	0.114
Average celibacy rate, inegalitarian areas	0.114	0.060	0.044	0.114	0.135	0.114	0.142

Notes: The table reports the six simulated moments from our structural estimation, together with simulated aggregate celibacy rates, under the benchmark model parameters and a series of one-at-a-time parameter changes. The *Model* column reports simulated moments obtained using the estimated parameter values reported in Table 8. The remaining columns report simulated moments obtained after changing a single parameter while holding all other parameters at their benchmark values. Specifically, the parameters θ , s_f , ν^i , μ_ω , and σ_ω are increased by 20%, whereas the egalitarian co-residence preference parameter ν^e is fixed at 0.5.

Appendix C. Data appendix

C.1 Figures and Tables

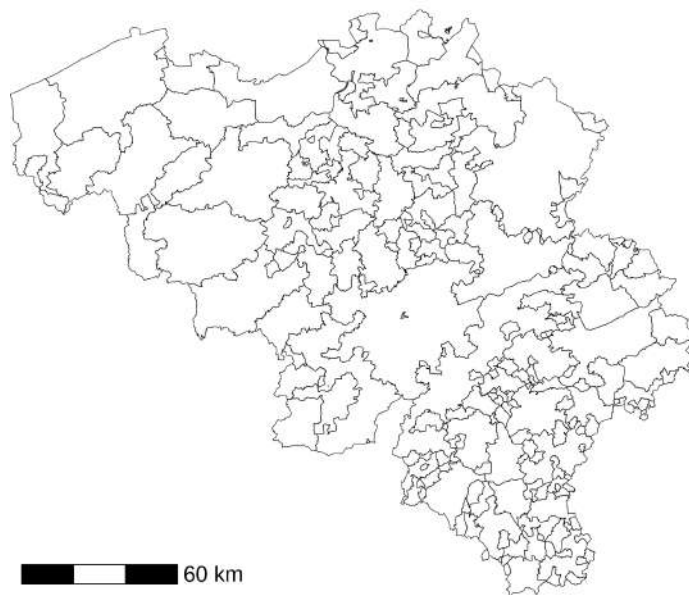
Table C1: Historical maps used for reconstructing judicial district boundaries in Belgium

Region	Date	Reference	Collection	URL
Comté de Flandre	1752	Robert de Vaugondy and Robert de Vaugondy (1752)	British Library	Link
Comté de Hainaut	1720	Jaillet (1720)	Moll's Map Collection	Link
Comté de Namur	1740–1750	Nolin and de Tralage (1740)	Moll's Map Collection	Link
Duché de Brabant	1730	Ottens and Ottens (1730)	Utrecht University Library	Link
Duché de Brabant	1701–1725	Allard (1701)	Moll's Map Collection	Link
Duché de Limbourg	1696	Sanson (1696)	Moll's Map Collection	Link
Duché de Luxembourg	1736	Jaillet (1736)	Moll's Map Collection	Link
Duché de Luxembourg	1705	Jaillet (1705)	Kramerius (Charles University)	Link
Principauté de Liège	1740–1760	Seutter and Lotter (1740)	Moll's Map Collection	Link
Principauté de Liège	1735–1740	Maire, Le Clerc, and Leloup (1735)	Moll's Map Collection	Link
Principauté de Liège	1696–1711	Sanson and Scherm (1696)	Moll's Map Collection	Link

Notes: This table lists the historical maps from the Moravian Library's Moll's Map Collection and other sources used to construct the GIS of judicial districts in Belgium.

Figure C1: Historical judicial districts

(a) Belgium



(b) France

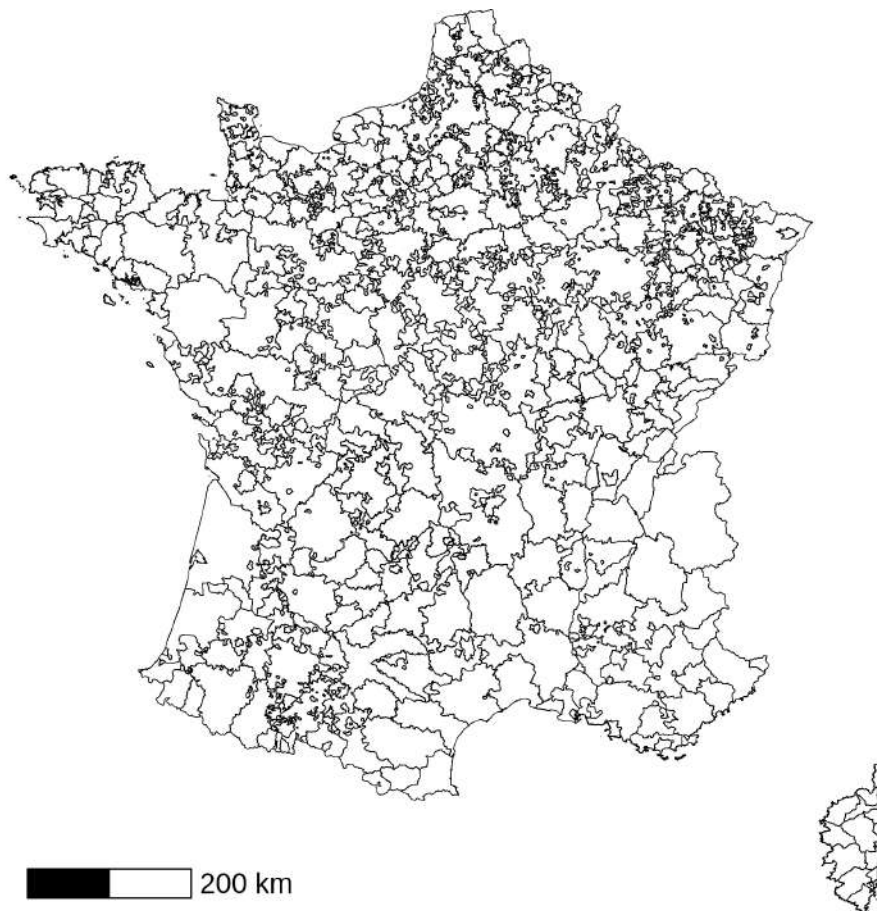
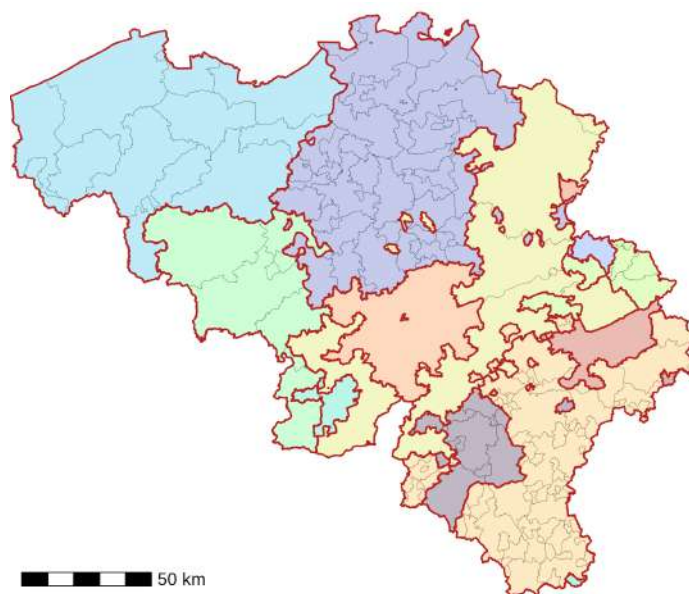
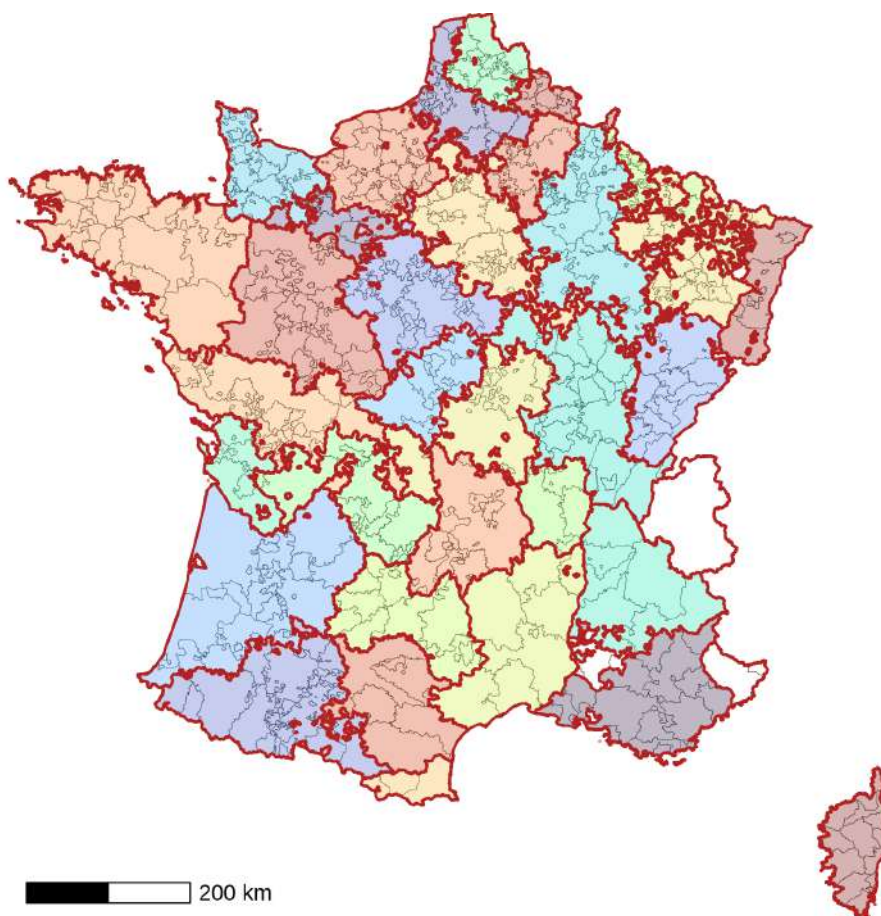


Figure C2: Region fixed effects

(a) Belgium (provinces, duchies, independent counties)



(b) France (*Généralité*)



Notes: This figure displays regions (red borders) superimposed over judicial districts (gray borders). Regions comprise *Généralité* for France, and provinces, independent counties, and duchies for Belgium.

Table C2: Inheritance rules across customs, Belgium and France

		Egalitarian		Inegalitarian	
		Partible + W. included %	Partible + W. excluded %	Impartible + W. included %	Impartible + W. excluded %
	N				
<i>Belgium</i>					
Rural	59	62.7	22.0	5.1	10.2
Urban	1,583	16.9	50.3	10.8	21.7
All	1,642	18.6	49.3	10.6	21.3
<i>France</i>					
Rural	141	46.8	13.5	7.8	30.5
Urban	703	28.0	24.0	37.3	9.7
All	844	31.2	22.3	32.3	13.2

Notes: This table shows the share of rural and urban customs under *Partible*—non-movable assets divided equally among multiple heirs; *Impartible*—a single heir favored; *W. included*—women included in inheritance; and *W. excluded*—women excluded from inheritance. Customs missing classification on partibility or women’s inclusion are kept in the denominator but not reported in the four category columns; percentages therefore need not sum to 100.

Figure C3: Example of a profile in [Geni.com](https://www.geni.com)

Elisabeth van Kerckhoven

[+ Follow](#)
[Actions ▾](#)

No path found to Elisabeth van Kerckhoven.



Elisabeth van Kerckhoven

Gender: Female
Birth: March 08, 1741
Hingene, Antwerpen, België (Belgium)
Death: October 16, 1824 (83)
Hingene, Antwerpen, België (Belgium)
Place of Burial: Hingene, Antwerpen, België (Belgium)
Immediate Family: Daughter of [Bernardus van Kerckhoven](#) and [Anna Maria van Baerel](#)
Sister of [Joannes Adrianus van Kerckhoven](#); [Petrus van Kerckhoven](#); [Cornelius van Kerckhoven](#); [Clara Maria van Kerckhoven](#); [Anna van Kerckhoven](#) and 3 others
Added by: [Jos Johannes Maria Kerkhoven](#) on June 13, 2019
Managed by: [Jos Johannes Maria Kerkhoven](#)

Matches

[Research this Person](#)

[Contact Profile Manager](#)

[View Tree](#)

Overview

Media

Timeline

Discussions

Sources

Revisions

DNA

About

GEDCOM Note

overleden in haar wooning Wijk A nr 127 alhier, oud 83 jaar, 7 maanden en 8 dagen, ongetrouwde dochter van Bernardus en van Anna Maria Van Barel, aangifte door Joannes Franciscus Toebente, kuiper, 36, neet

GEDCOM Note

Statistics

Family Tree

417

Blood Relatives

441

Ancestors

12

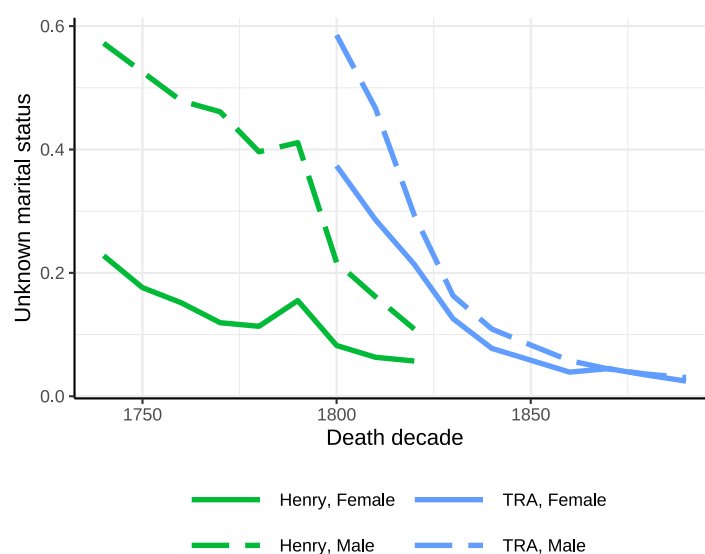
Followers

1

Source: [Geni.com](https://www.geni.com)

105

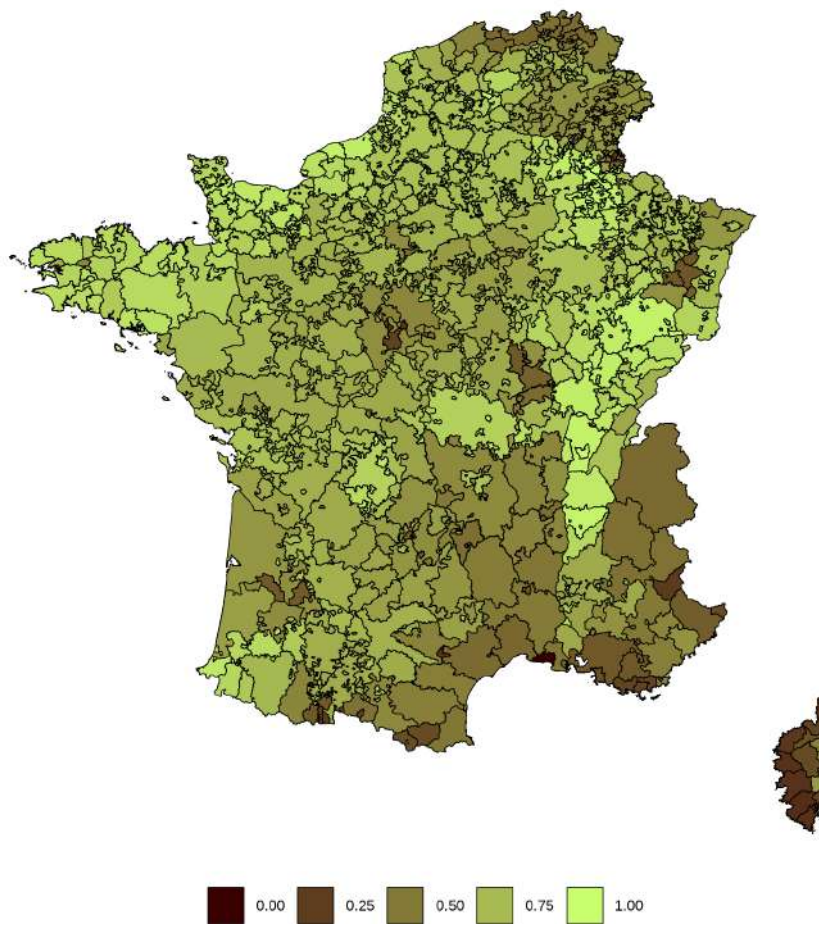
Figure C4: Missing marital status in TRA and Henry datasets



Notes: This figure shows the share of individuals with unknown marital status in the Henry parish family reconstitution dataset and the TRA estate declaration records, by death decade and gender (solid lines: women; dashed lines: men). Both datasets exhibit high rates of missing marital status before 1800—for example, 40–60% of women dying before 1800 have missing marital status in the Henry database. This likely explains why celibacy estimates from these sources fall below Geni estimates in earlier periods (see Figure 4).

Figure C5: Local measures of women's economic opportunities

(a) Pasture suitability by judicial district, Belgium and France



(b) Beguinages, Belgium

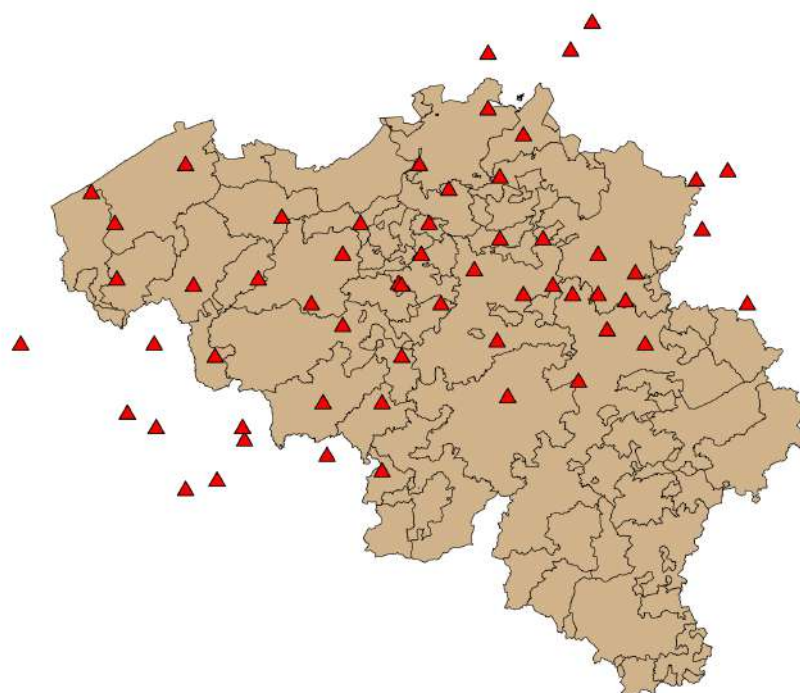


Table C3: Summary statistics for women born 1500–1750.

	(1)	(2)	(3)	(4)	(5)	(6)
	Rural customs			Urban customs		
	Mean	SD	N	Mean	SD	N
<i>Panel A. All</i>						
Lifetime celibacy	0.10	0.30	70,728	0.09	0.29	4,964
Age at first marriage	23.85	4.48	41,528	24.72	4.33	2,834
Egalitarian inheritance	0.54	0.50	70,728	0.60	0.49	4,846
Pasture suitability index	0.71	0.14	70,717	0.76	0.13	4,964
Born in Belgium	0.19	0.39	70,728	0.41	0.49	4,964
Born in France	0.81	0.39	70,728	0.59	0.49	4,964
<i>Panel B. Rare names</i>						
Lifetime celibacy	0.08	0.26	37,312	0.07	0.25	2,932
Age at first marriage	23.85	4.46	21,917	24.62	4.42	1,631
Egalitarian inheritance	0.51	0.50	37,312	0.59	0.49	2,845
Pasture suitability index	0.71	0.14	37,306	0.75	0.13	2,932
Born in Belgium	0.21	0.40	37,312	0.45	0.50	2,932
Born in France	0.79	0.40	37,312	0.55	0.50	2,932
<i>Panel C. H-sample</i>						
Lifetime celibacy	0.22	0.41	31,925	0.19	0.39	2,378
Age at first marriage	23.85	4.44	18,186	24.65	4.28	1,350
Egalitarian inheritance	0.52	0.50	31,925	0.58	0.49	2,342
Pasture suitability index	0.71	0.14	31,922	0.77	0.12	2,378
Born in Belgium	0.20	0.40	31,925	0.38	0.49	2,378
Born in France	0.80	0.40	31,925	0.62	0.49	2,378
<i>Panel D. Off main line</i>						
Lifetime celibacy	0.23	0.42	26,284	0.17	0.38	2,223
Age at first marriage	24.43	4.50	12,985	25.19	4.36	1,153
Egalitarian inheritance	0.51	0.50	26,284	0.57	0.50	2,167
Pasture suitability index	0.70	0.14	26,280	0.75	0.13	2,223
Born in Belgium	0.21	0.41	26,284	0.42	0.49	2,223
Born in France	0.79	0.41	26,284	0.58	0.49	2,223

Notes: The sample is women born in 1500–1750, whose Geni record can be geo-located, and who died after 40. Age at first marriage is reported among women who married during reproductive age (15 to 35). Columns (1) to (3) consider women born in rural custom regions, i.e., > 1 km from the centroid of an urban custom settlement. Columns (4) to (6) consider women born in towns with an urban custom, i.e., locations within 1km of urban custom centroid with a population over 5,000 ([Buringh 2021](#)).

Table C4: Expenditure shares from Horrell (2023).

	Expenditures per annum, d.			Expenditure shares		
	1700	1750	1799	1700	1750	1799
<i>Panel A. Consumption</i>						
Food	5,822.3	5,727.7	6,502	0.707	0.665	0.623
Ale and tobacco	-	-	875	-	-	0.084
<i>Panel B. Household</i>						
Candles	115	118	} 374.7	0.014	0.014	} 0.036
Soap	51	60		0.006	0.007	
Firewood and fuel	632.2	569.6	499.1	0.077	0.066	0.048
Rent (Building costs)	360	600	576.9	0.044	0.070	0.055
Furniture	384	528	600.3	0.047	0.061	0.058
Clothing	867.4	952.5	992.8	0.105	0.111	0.095
Services	-	52	12.3	-	0.006	0.001
<i>Panel C. Totals</i>						
Total consumption	5,822.3	5,727.7	7,377	0.707	0.665	0.707
Total household	2,409.6	2,880.1	3,056.1	0.293	0.335	0.293
Total expenditures	8,231.9	8,607.8	10,433.1	1	1	1

Notes: Expenditures are in pence per annum. Source: [Horrell \(2023\)](#) (Table 1 and Appendix S1 Tables 4 and 5).

C.2 Potential biases in crowdsourced genealogies

This appendix describes in detail three of the most common biases emerging from crowdsourced genealogies which, like Geni, are built by amateur genealogists: false-positive links, patrilineal bias, and survival bias. We also provide additional details on the three increasingly stringent quality filters that we use to address these biases: the rare-names filter, the h-sample restriction, and the off-main-line sample. Out of a celibacy sample of 70,728 women, these filters retain, respectively, 37,312 (52.8 percent), 31,925 (45.1 percent), and 26,284 (37.2 percent) of women.⁵⁸

False-positive links and the rare-names control filter A common source of bias in crowdsourced genealogies emerges from false-positive links. An amateur genealogist may incorrectly link her family tree to the family tree reconstructed by another amateur genealogist bearing the same family name, even when they have no true common ancestor. This type of false-positive link is particularly salient in [geni.com](https://www.geni.com), where the webpage directly suggests matches to trees built by other genealogists; for illustration, see the tab in the top right corner of the Geni profile shown in Appendix Figure C3.

Similarly, an amateur genealogist may incorrectly assign an ancestor to a birth, baptism, marriage, or death record of another individual bearing the same surname. This is especially problematic for migrants who can often be incorrectly linked to the records of an individual bearing the same name in the destination parish.

Overall, such false-positive links are more likely to occur for individuals with common family names. For example, an individual named Jean Martin—bearing one of France’s most common surnames—is more likely to be incorrectly linked than someone named Jean Llorach—whose surname is highly uncommon.

To address this potential bias, we construct our first quality filter: the *rare names* sample. This filter retains individuals with surnames of below-median frequency. Throughout the analysis, we show that our stylized facts are robust to restricting the sample to individuals satisfying the rare-names quality filter.

Patrilineal bias and the h-sample control filter Another common bias in crowdsourced genealogies is the patrilineal bias [Blanc \(2022\)](#). This bias happens when users provide information on their direct ancestors (parents, grandparents, great-grandparents, ...) but ignore their collateral ancestors (uncles, granduncles, great-granduncles, ...).

We address this bias by showing that all our results are robust to restricting the sample to Geni profiles satisfying the horizontal lineage restriction (*h-sample*) developed by [Blanc \(2022\)](#). The h-sample restriction retains only those individuals belonging to a lineage where at least one ancestor in the preceding four generations had two or more children recorded, i.e., where collateral ancestors are included in the family tree. In practice, for this quality-control filter, we reconstruct the family tree up to four generations for each Geni profile from the one-generation links to parents and spouses provided in the original data. Because the original data comprises 153 million profiles, we link each individual to all her ancestors through a series of iterations.

⁵⁸In the age at first marriage sample (N=65,200), the rare-names filter retains 33,796 women (51.8 percent), the h-sample 30,054 women (46.1 percent), and the off-main-line sample 26,284 women (40.3 percent).

Figure C6 illustrates the h-sample restriction by showing two hypothetical family trees at [geni.com](http://www.geni.com). Panel (a) shows a family tree with no collateral ancestors recorded, and hence, suffering severely from patrilineal bias. Panel (b) shows a family tree with collateral ancestors recorded, which are highlighted in green. The quality filter implies that the individual highlighted in blue is excluded from the h-sample in Panel (a), and included in Panel (b).

Survival bias and the off-main-line control filter Finally, crowdsourced genealogies may suffer from survival bias. This bias emerges from the fact that an amateur genealogist is more likely to record a direct ancestor than an individual with whom she has no direct family link. This introduces selection of high-fertility individuals into the sample, as they are more likely to leave a descendant who eventually becomes an amateur genealogist.

To address this issue, we construct the *off-main-line* quality control filter indicating individuals (generation t) who satisfy two conditions: First, they have no great-great-grandchildren ($t + 4$); Second, their parents ($t - 1$) have at least one grandchild ($t + 1$). The first condition is designed to (probabilistically) exclude individuals who are direct ancestors of an amateur genealogist. The second condition guarantees that at least one sibling in generation t was linked to his or her spouse, and hence, avoids classifying as off-main-line cases where the genealogist gave up on linking a set of siblings to their spouses.

Figure C7 illustrates the off-main-line quality control filter by showing a hypothetical family tree constructed by an amateur genealogist (blue). The hypothetical tree highlights individuals included (red) and excluded (gray) from the off-main-line quality filter. For example, individual “A” is excluded from the off-main-line sample because she has a great-great-grandchildren (i.e., a direct ancestor) who becomes an amateur genealogist (blue). Individual “B” is included in the off-main-line sample because she has no great-great-grandchildren. Here connection to the amateur genealogist (blue) is through a collateral branch of the tree. Individual “C” is also not directly connected to the amateur genealogist (blue), but is excluded from the off-main-line sample because of the second condition—her parents have no grand-children. Note that, by construction, the off-main-line sample will display a higher celibacy, as celibate individuals do not have any (legitimate, recorded) children and hence are more likely to be included in the off-main-line sample, while individuals with descendants are less likely to be retained in this quality filter. Note also that the second condition moderates this upward bias in celibacy.

Overall, we find little difference in our results using the h-sample, off-main-line, and rare-names quality control filters. We believe that this is because our analysis requires a precise geolocation of www.geni.com profiles, which is already a strict quality control filter. In other words, amateur genealogists who are able to provide a precise birthplace are likely to provide quality information in general.

C.3 Sources for balancedness variables

This appendix describes in detail how the variables evaluated for balancedness (see Table 1) are constructed, as well as the original sources for these data.

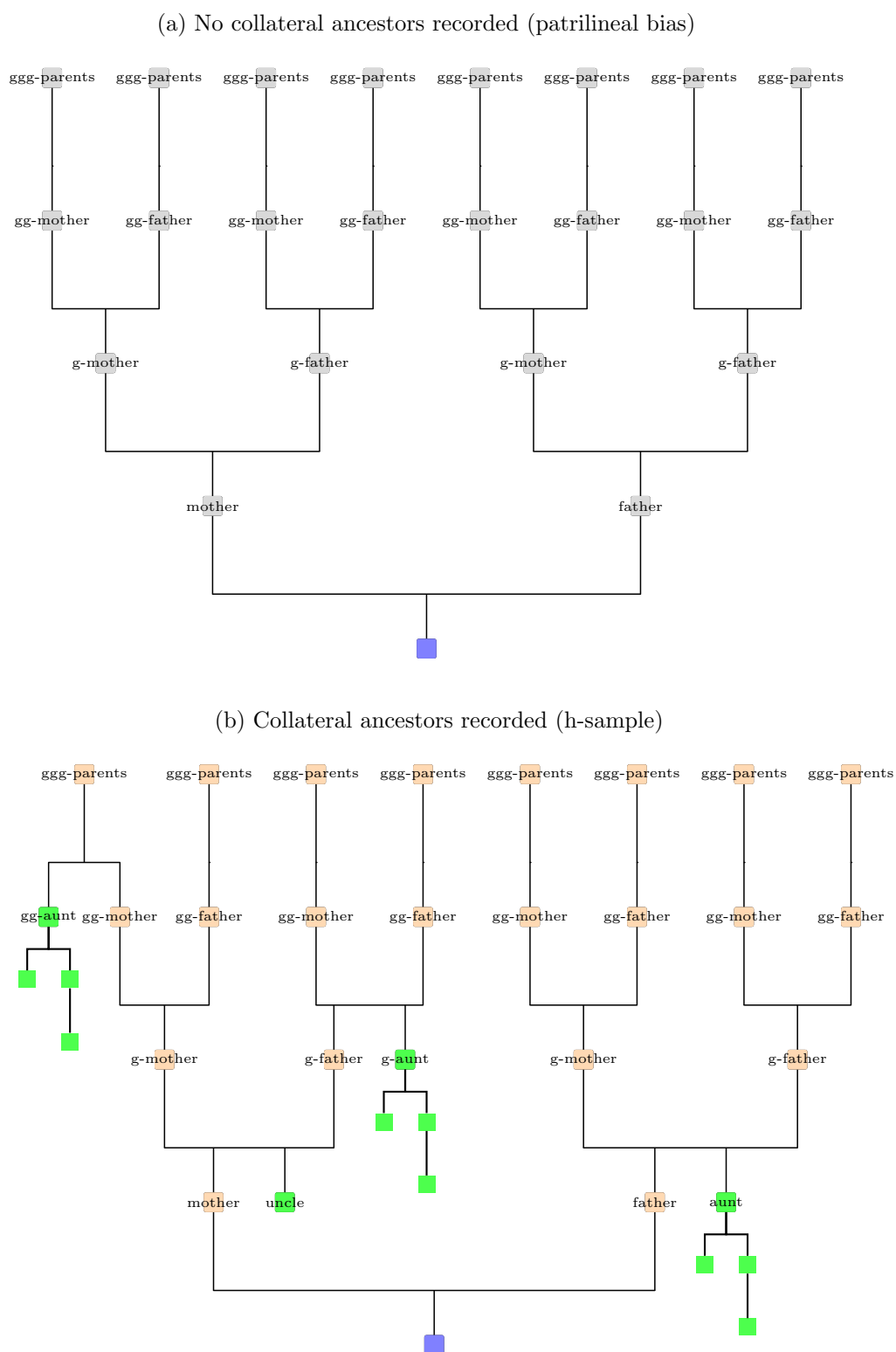


Figure C6: H-sample restriction

Notes: This figure shows two hypothetical family trees at geni.com. Panel (a) shows a family tree with no collateral ancestors recorded (patrilineal bias); Panel (b) shows a family tree with collateral ancestors recorded (h-sample). Blue indicates the individual under consideration. Green indicates collateral ancestors in the family tree. Orange indicates direct ancestors of an individual included in the h-sample. Gray indicates direct ancestors of an individual excluded from the h-sample.

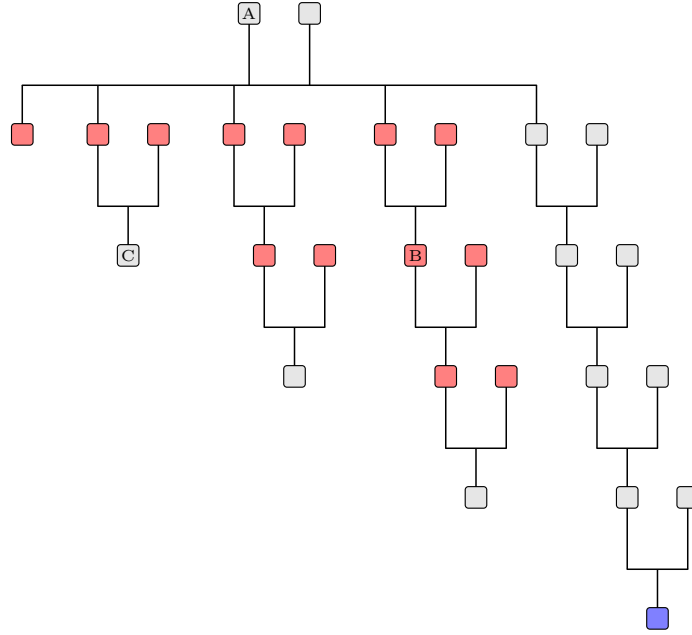


Figure C7: Off-main-line sample restriction

Notes: This figure shows a hypothetical family tree at geni.com. Blue indicates the amateur genealogist who is reconstructing her tree in geni.com. Red indicates individuals included in the off-main-line quality control sample. That is, all individuals (t) who have no great-great-grandchildren ($t+4$), but whose parents ($t-1$) have at least one grandchild ($t+1$). Gray indicates individuals excluded from the off-main-line quality control sample.

Pasture suitability index. The pasture suitability index is the 2005 FGSD pasture suitability index ([van Velthuis et al. 2007](#)). It is extracted from a 5 arc-minute resolution raster image. The original values are scaled from -997 to 10,000 with “urban, closed forest, or irrigated pixels” having negative values. We divide the original scale by 10,000 to have an index ranging from approximately 0 to 1.

Caloric, plow, wheat, barley, oats, potato, cabbage, carrot, and chickpea suitability index. The caloric suitability index is the post-1500 average caloric suitability index from [Özak \(2015\)](#) (c.f. ([Galor and Özak 2015](#); [Galor and Özak 2016](#))). The plow suitability index is the post-1500 plow positive caloric suitability index from the same source (c.f. ([Galor, Özak, and Sarid 2016](#))). The wheat, barley, oats, potato, cabbage, carrot, and chickpea suitability indices are the rain-fed, low input indices from the same source. All are extracted from the 5' by 5' grid cell resolution rasters.

Ruggedness. The ruggedness variable is the terrain ruggedness index, 100 m, from [Nunn and Puga \(2012\)](#). It is extracted from 30 arc-second grid-cell ASCII grid.

Precipitation and temperature (min, max, average). The precipitation and temperature variables are the annual average of the average monthly precipitation in mm and the average, min, and max monthly temperatures in degrees celcius from the WorldClim 2 database ([Fick and Hijmans 2017](#)). The monthly variables are extracted from an interpolated climate surface rasters at the 10-minute spatial resolution.

Roman roads. The number of Roman Roads within 10km are based on the Roman road network shapefile, 2008 version, from the Digital Atlas of Roman and Medieval Civilizations [McCormick et al. \(2013\)](#).

Universities and Academies. The number of academies and universities by 1750 within 10km are from the Repertorium Eruditorum Totius Europae, version 1.1 ([de la Croix 2026](#)). Latitude and longitude data were accessed from ([Curtis et al. 2026](#)).

Bishoprics. The number of bishoprics within 10 km by 600, 900, 1000, 1200, and 1450 are from the bishopric shapefiles from the Digital Atlas of Roman and Medieval Civilizations ArcGIS Feature Server ([Mapping Past Societies](#)).

Riots. The number of riots by 1750 within 10 km are from the HiSCoD database ([Chambru and Maneuvrier-Hervieu 2024](#)). Latitude and longitude data were accessed from ([Chambru and Maneuvrier-Hervieu 2023](#)).

Appendix D. Validation of pasture suitability as proxy for women’s economic opportunities

This appendix provides evidence supporting the use of FAO’s pasture suitability index as a proxy for women’s economic opportunities. First, we review historical evidence from pre-modern Europe on female farm employment and the gender division of agricultural labor, showing that women were disproportionately concentrated in pasture and animal husbandry tasks. Second, we evaluate empirically the link between pasture suitability and women’s labor market opportunities in our setting. Specifically, we digitize data on rural wages in the 1830s for men and women in 40 Belgian arrondissements from the agricultural census and show that pasture suitability is associated with lower gender wage gaps.

Historical evidence. In northwestern Europe, livestock farming—particularly dairying and service in pastoral farms—was one of the most important sources of paid rural employment for women in the pre-modern period. [Whittle \(2005, p. 53\)](#) summarizes this pattern in her study of rural England between 1440 and 1650:

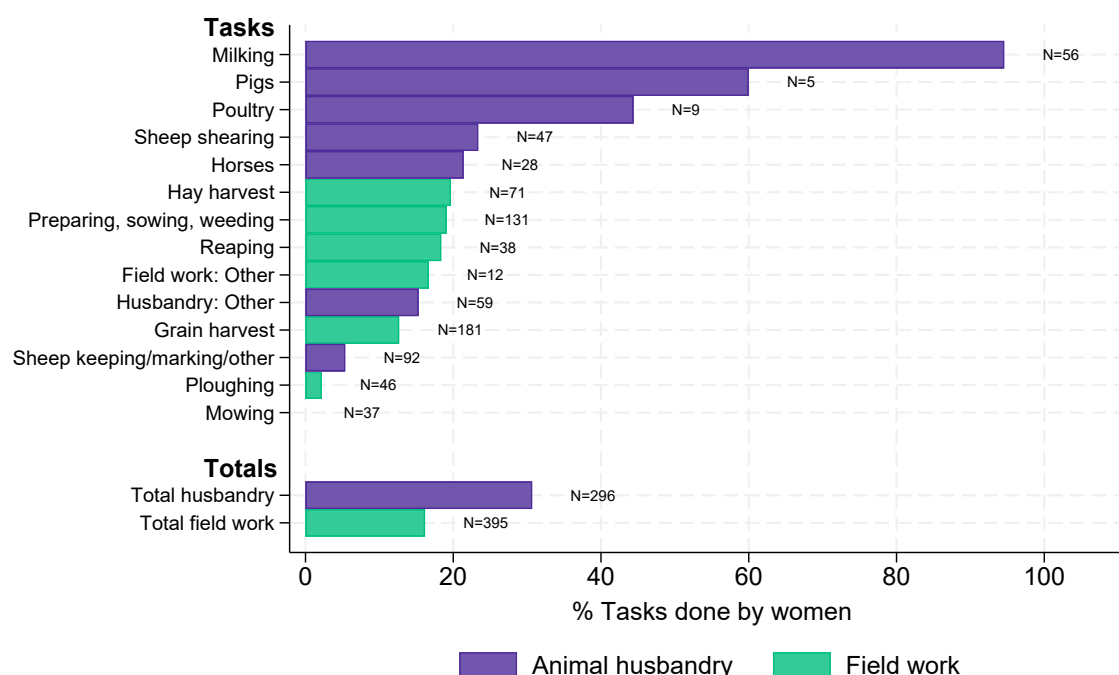
The employment of female servants has been seen as an indicator of the amount of work available for women in rural economies, for instance that pastoral regions employed more female servants than arable areas, because dairying provided more work for women.

Indeed, farm service was common among women in pre-modern Europe. [Hajnal \(1982, Table 14\)](#) uses data from nine Flemish villages to show that 29–36 percent of women worked as farm servants between ages 15 and 30. [Kussmaul \(1981\)](#) documents that large numbers of young women—up to half of women between ages 15 and 25—were employed as servants in husbandry in early-modern England. This was especially the case in the north-west, where agriculture was more pastoral. [Kussmaul \(1981\)](#) further shows that female servants were deeply involved in farm work, rather than just providing domestic service to the farms. Relatedly, [Voigtlander and Voth \(2009\)](#) argue that, after the Black Death, labor scarcity in northwestern Europe encouraged a shift from arable farming to pastoral agriculture, particularly livestock and dairying. This generated greater demand for women’s labor and expanded women’s wage-earning opportunities through service in husbandry. Consistent with this view, [Goldberg \(1992, p. 160\)](#) shows that service in rural areas was “more feminised” in pastoral communities than in arable communities based on evidence from the late fourteenth century Poll Tax returns. Specifically, he writes that:

[in] rural pastoral regions there were equal numbers, while in arable areas males outnumbered females in service by as much as two to one.

Perhaps the most direct evidence on the gender division of tasks in pre-modern agriculture comes from [Whittle and Hailwood \(2020\)](#). Using court records from five counties in south west England between 1500 and 1700, they analyze 536 work tasks undertaken by women and men

Figure D1: Gender division of tasks in agriculture, south-west England (1500-1700)



Notes: This figure displays the percentage of work tasks performed by women, separating tasks related to animal husbandry (purple) and agricultural field work (green). *N* is the total number of work tasks performed by men and women, by category. The source is Whittle and Hailwood (2020, Table 9), which reports data from 536 work tasks listed in court records in Cornwall, Devon, Hampshire, Somerset, and Wiltshire.

in agriculture.⁵⁹ Figure D1 displays the percentage of work tasks performed by women based on Whittle and Hailwood (2020, Table 9)'s data, separating tasks related to animal husbandry (purple) and agricultural field work (green).

The evidence suggests a clear gendered division of labour within agricultural work. Women were overwhelmingly concentrated in husbandry tasks, especially milking, where they performed 94.6 percent of the recorded tasks, as well as pig keeping (60 percent) and poultry care (40 percent). Women also appeared in other livestock-related activities such as sheep shearing (23.4 percent) and tending to horses (21.4 percent), although at lower rates. By contrast, their participation in field work was consistently more limited: women were involved in hay harvest, preparing the field, sowing, weeding, and reaping, but in none of these activities their share of tasks reached 20 percent. Women rarely participated in grain harvesting (12.7 percent) and almost never in ploughing (2.2 percent) or mowing (0 percent). Overall, the share of female tasks in all animal husbandry activities (30.7 percent) was twice as large as the corresponding share in agricultural field work (16.2 percent).

Similar patterns are documented in France and Belgium. In her study of rural France between the sixteenth and eighteenth centuries, Beauvalet (2005, p. 89–102) argues that

There was a genuine division of labor [...] men worked in the fields [...] [while women

⁵⁹Court records include (i) coroners' reports of accidental deaths and witness statements in (ii) church court depositions and (iii) quarter sessions examinations. The five counties covered are Cornwall, Devon, Hampshire, Somerset, and Wiltshire.

Figure D2: Male and female wages in the Belgian agricultural census 1846 (extract)

PROVINCES.	ARRONDISSEMENTS ADMINISTRATIFS.	AVEC NOURRITURE.											SANS NOURRITURE.										
		NOMBRE des COM- MUNES.	1830.		1835.		1840.		1846.		MOYENNE.		NOMBRE des COM- MUNES.	1830.		1835.		1840.		1846.		MOYENNE.	
			HOMMES.	FEMMES.	HOMMES.	FEMMES.	HOMMES.	FEMMES.	HOMMES.	FEMMES.	HOMMES.	FEMMES.		HOMMES.	FEMMES.	HOMMES.	FEMMES.	HOMMES.	FEMMES.	HOMMES.	FEMMES.	HOMMES.	FEMMES.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Anvers.	Anvers. . . .	45	Fr. C.	Fr. C.	Fr. C.	Fr. C.	Fr. C.	Fr. C.	Fr. C.	Fr. C.	Fr. C.	Fr. C.	Fr. C.	Fr. C.	Fr. C.	Fr. C.	Fr. C.	Fr. C.	Fr. C.	Fr. C.	Fr. C.	Fr. C.	Fr. C.
	Malines. . . .	9	0.75	0.45	0.75	0.45	0.75	0.45	0.75	0.45	0.75	0.45	41	4.43	0.70	4.43	0.70	4.42	0.70	4.43	0.70	4.43	0.70
	Turnhout. . . .	28	0.68	0.38	0.68	0.38	0.68	0.38	0.68	0.38	0.68	0.38	39	0.99	0.69	0.99	0.69	0.99	0.69	0.99	0.69	0.99	0.69
	LA PROVINCE.	82	0.59	0.38	0.59	0.38	0.59	0.38	0.59	0.38	0.59	0.38	22	4.01	0.76	4.01	0.76	4.01	0.76	4.02	0.77	4.01	0.76
Brabant.	Bruxelles. . . .	62	0.65	0.40	0.65	0.40	0.65	0.40	0.65	0.40	0.65	0.40	93	4.05	0.68	4.05	0.68	4.05	0.68	4.05	0.68	4.05	0.68
	Louvain. . . .	23	0.50	0.44	0.50	0.44	0.50	0.44	0.50	0.44	0.50	0.44	95	0.91	0.68	0.91	0.68	0.91	0.69	0.92	0.69	0.91	0.68
	Nivelles. . . .	45	0.64	0.33	0.62	0.39	0.63	0.39	0.64	0.44	0.63	0.39	96	0.92	0.66	0.93	0.66	0.93	0.66	0.94	0.67	0.93	0.66
	LA PROVINCE.	49	0.64	0.47	0.65	0.47	0.66	0.50	0.68	0.51	0.66	0.49	88	4.01	0.61	4.03	0.62	4.04	0.63	4.04	0.63	4.03	0.62
nord-occidentale.	Bruges. . . .	87	0.58	0.42	0.58	0.42	0.59	0.44	0.60	0.44	0.59	0.43	279	0.95	0.65	0.95	0.66	0.95	0.66	0.96	0.66	0.95	0.65
	Courtrai. . . .	2	0.77	0.49	0.77	0.49	0.77	0.49	0.77	0.49	0.77	0.49	39	4.01	0.56	4.02	0.57	4.02	0.57	4.02	0.57	4.02	0.57
	Dixmude. . . .	43	0.56	0.41	0.56	0.41	0.51	0.39	0.50	0.36	0.54	0.39	2	4.44	0.90	4.44	0.90	4.45	0.85	0.90	0.82	4.06	0.82
	Furnes. . . .	42	0.65	0.49	0.65	0.49	0.61	0.44	0.61	0.44	0.63	0.45	41	4.16	0.75	4.19	0.75	4.16	0.74	4.15	0.72	4.16	0.74
	Ostende. . . .	46	0.72	0.52	0.72	0.52	0.72	0.52	0.74	0.53	0.72	0.52	42	4.33	0.94	4.42	0.94	4.43	0.96	4.50	0.96	4.44	0.95
	Roulers. . . .	2	0.65	0.47	0.65	0.47	0.63	0.43	0.60	0.44	0.64	0.45	25	4.28	0.79	4.27	0.78	4.28	0.77	4.29	0.78	4.03	0.78

Source: *Résumés par Arrondissement et par Province* (1850)

were] responsible for the cows, pigs, and all the poultry on the farm [...] as major agricultural treatises such as *La Maison rustique* make clear.

For Belgium, similar evidence emerges from [Helsen \(2023, pp. 30–33\)](#), who analyzes nine eighteenth-century farm accounts from across Flanders and documents that “agricultural work was likely always segregated by gender to some degree.” Tasks “exclusively or predominantly performed by men in Flanders did include heavy manual labour,” while women were excluded from “tilling and manuring the soil, transporting all kinds of goods, working with horses and jobs related to forestry and peat digging.” [van Cruyningen et al. \(2005, p. 50–51\)](#) explicitly links women’s responsibility over livestock to financial autonomy within the household. Describing eighteenth-century Zeeland, he writes that

Dairy production not only meant a great deal of work for farmers’ wives, but it also provided them with a source of income. They kept the money earned from the sale of dairy products and eggs themselves [...] Because they had their own income, they could independently decide on the purchase of household goods.”

He concludes that this gave women “a relatively independent position within the farming enterprise” ([van Cruyningen et al. 2005, p. 43](#)).

Taken together, the evidence suggests that during the early-modern period, women in rural areas of northwestern Europe were employed as farm servants. Although women participated in different agricultural tasks, their comparative advantage and employment opportunities were disproportionately concentrated in animal husbandry, particularly in dairying and other livestock-related tasks. These activities constituted an important source of paid labor for women. Climatic and soil conditions favoring pasture therefore provide a plausible proxy for women’s economic opportunities in rural areas. We next validate this proxy in our study setting using newly digitized wage data from the 1846 Belgian agricultural census.

Validation with wage data from agricultural censuses. Here we evaluate empirically the link between the pasture suitability index and women’s labor market opportunities in our study setting. To do so, we digitize data on rural wages from the 1846 Belgian agricultural census (*Résumés par Arrondissement et par Province* 1850). For each arrondissement, the census reports wages for male and female journaliers in rural areas in 1830, 1835, 1840, and 1846. We use the 1830 wages—the closest to our study period—to construct arrondissement-level measures of gender wage gaps. Specifically, we measure the ratio of female-to-male wages.⁶⁰ We focus on wages without food (*sans nourriture*) to better isolate wage-based employment relationships. For the sake of illustration, Figure D2 provides an extract of the agricultural census.

Figure D3 displays the geographical distribution of the female-male wage gap across arrondissements in Belgium (panel (a)), along the FAO’s pasture suitability index—our proxy for women’s economic opportunities (panel (b)). Both variables are spatially correlated: arrondissements with climatic and soil conditions suited for pasture and animal husbandry are concentrated in central Belgium (light green areas), where female wages reached up to 70 percent of male wages (light blue). In contrast, in the south of the Hainaut and in the Antwerp provinces the pasture suitability index and women’s wages relative to men are low.

Figure D4 illustrates this positive spatial correlation with scatterplots. Specifically, we plot the pasture suitability index against the female-to-male wage ratio across arrondissements within each of the 9 provinces in the data. With the sole exception of Antwerp and Limburg, the figure shows a positive association between pasture suitability and female wages relative to men in rural areas. In other words, the association between our proxy and women’s wages relative to men is likely not driven by cultural and linguistic divides (e.g., Wallonia-Flanders) or broad geographical factors (e.g., east-west differences), but appears within small, clustered geographical areas.

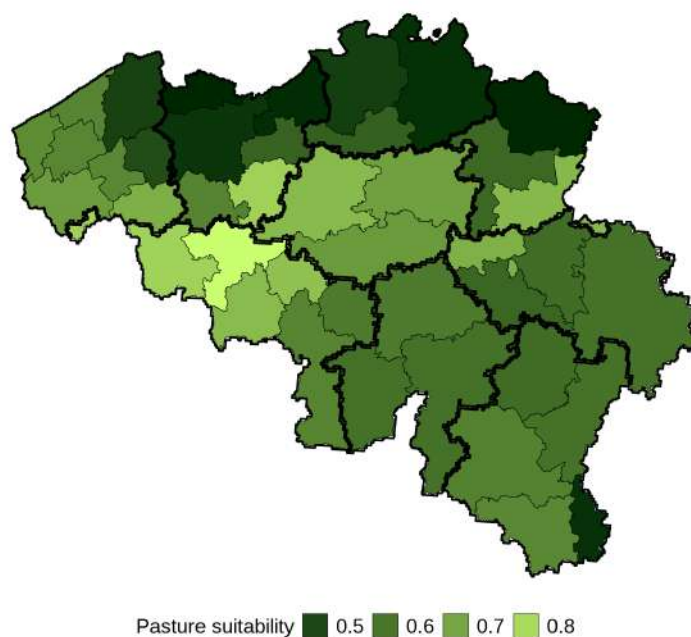
Table D1 summarizes these patterns by presenting estimates of a fixed-effects regression. In detail, we regress the female-to-male wage ratio on our pasture suitability proxy for women’s economic opportunities across 40 arrondissements, with fixed effects for the 9 provinces of Belgium. We find a relatively strong, statistically significant association between these two variables. In detail, a ten percentage-point increase in pasture suitability is associated with a 2.5 percentage-point increase in female wages relative to male wages. Relative to the sample mean, this corresponds to an increase by 4 percent. The estimate is statistically significant at the 5-percent level. In sum, these regression results suggest that pasture suitability predicts lower gender wage gaps in Belgian agricultural census data.

Taken together, the historical and empirical evidence strongly suggests that areas more

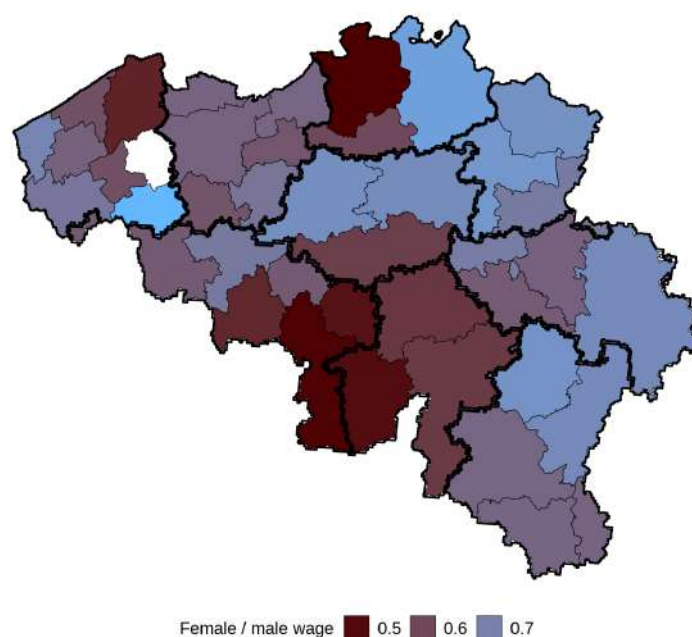
⁶⁰Because the available geographic information system (GIS) shapefiles correspond to modern administrative boundaries (ODWB 2024), we make three adjustments to reconcile them with historical boundaries. First, we reassign the modern arrondissement of La Louvière to the arrondissement of Thuin, since three of La Louvière’s four municipalities (Binche, Estinnes, and Morlanwelz) were originally part of Thuin. Second, we merge Halle-Vilvoorde and Brussels in the arrondissement shapefiles, as these jurisdictions were split only in 1963 and are therefore treated jointly in the 1846 agricultural census. Third, to construct region fixed effects consistent with our main analysis, we recreate the historical Province of Brabant by combining Walloon Brabant, Brussels-Capital Region, and Flemish Brabant from the modern GIS shapefiles. Finally, because the censuses do not provide wage data for the Thielt arrondissement, we exclude it from the analysis. Because of all these adjustments, our final sample covers 40 arrondissements out of the original 43.

Figure D3: Validation of pasture suitability proxy, maps

(a) Pasture suitability, by Arrondissement



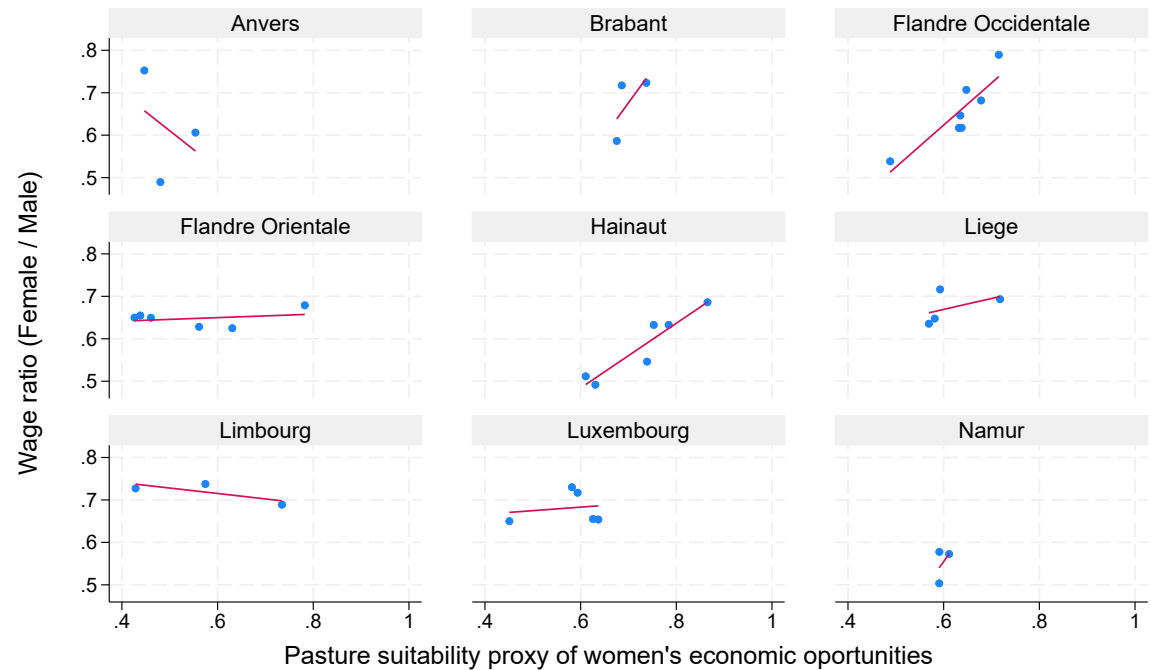
(b) Ratio of female to male wages, by Arrondissement



Notes: This figure displays the spatial distribution of the pasture suitability index developed by FAO (panel (a)) along the ratio of female to male wages derived from the Belgian agricultural census 1846 (1850) (panel (b)). Specifically, we consider rural wages without food for journaliers (*sans nourriture*). Maps at the Arrondissement level are from ODWB (2024).

suitable for pasture offered women greater labor market opportunities. Hence, it validates our approach of using FAO's pasture suitability index as a proxy for women's economic opportunities

Figure D4: Scatterplots of pasture suitability and gender wage ratio, by province



in rural areas.

Table D1: Pasture suitability and rural wages, FE estimates

	<i>Dep. variable:</i>	
	Female-to-male wage ratio	
	coefficient	std. error
Pasture suitability proxy	0.253**	(0.117)
Constant	0.489***	(0.073)
Region FE	Y	
Observations	40	
Adjusted R^2	0.297	
Mean dep. variable	0.644	

Notes: The sample consists of 40 rural arrondissements with wage data in the Belgian agricultural census of 1846. We consider rural wages without food for journaliers (*sans nourriture*). Region fixed effects comprise provinces. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.